

DEPARTMENT OF AGRICULTURE
CANADA

REPORT

OF THE

VETERINARY DIRECTOR GENERAL

(F. TORRANCE, B.A., D.V.S.)

FOR THE YEAR ENDING MARCH 31, 1914

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OTTAWA

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EXCELLENT MAJESTY
1915.

REPORT

OF THE

VETERINARY DIRECTOR GENERAL

HEALTH OF ANIMALS BRANCH,

OTTAWA, March 31, 1914.

SIR,—I have the honour to present my report as Veterinary Director General for the year ending March 31, 1914.

Following the lines laid down by my predecessor, Dr. Rutherford, the work of the branch has been continued with more or less success. In some directions, such as the control of glanders and of mange, much progress has been made; the country has been protected against invasion by diseases foreign to it; additional facts have been brought to light by the members of the branch engaged in scientific research; and there has been a marked advance in the division entrusted with the inspection of meat and canned foods.

On the other hand, I have to report a serious outbreak of dourine in the Province of Alberta, and continued losses from hog cholera. Both have been dealt with in a vigorous manner, and progress has been made, as will be seen in subsequent pages when the diseases are respectively commented upon.

The members of the staff, both in the inside and the outside service, have performed their duties, almost without exception, in a careful and earnest spirit, and I desire here to offer them my sincere thanks. Without their hearty co-operation the work of the branch would have suffered materially, and satisfactory progress could not have been made.

The following is a detailed statement of the diseases dealt with:—

GLANDERS.

The number of horses destroyed on account of this disease is much less than in any year since the policy of slaughtering reactors was put in operation. Three hundred and fifty-three (353) were slaughtered in 1914 as against six hundred and thirty-eight (638) in 1913. These figures are very encouraging and show conclusively that our policy of dealing with the disease is the right one. It may be added that Canada was the first country to adopt this policy, which has since been followed with success by many others.

STATISTICS.

DOMINION.

4 killed on inspection.
309 killed at first test.
37 " second test.
3 " third test.

353, valued at \$51,845, at a cost of \$34,563.31.

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146 showed clinical symptoms.

12,430 horses were tested with mallein, of which 349 reacted and were destroyed. Of the 349 reactors, 142 showed clinical symptoms of glanders at or during the test.

23 horses are under control for retest.

Of the above 353 horses slaughtered, 7 were killed without compensation as being diseased when imported into Canada.

PRINCE EDWARD ISLAND.

1 horse was tested and proved to be healthy.

NOVA SCOTIA.

23 horses were tested and proved to be healthy.

NEW BRUNSWICK.

1 killed at first test; no compensation was allowed for this horse, it being imported from the United States.

1 showed clinical symptoms.

186 horses were tested with mallein, of which 1 reacted and was destroyed. The reactor showed clinical symptoms of glanders at the time of testing.

No horses are under control for retest.

The horse slaughtered was in the electoral district of St. John.

QUEBEC.

38 killed at first test.

2 " second test.

—

40, valued at \$6,700.00, at a cost of \$4,466.66.

27 showed clinical symptoms.

674 horses were tested with mallein of which 40 reacted and were destroyed. Of the 40 reactors, 27 showed clinical symptoms of glanders at or during the test.

1 horse is under control for retest.

Of the 40 horses slaughtered—

28	were	in	the	electoral	district	of	Chicoutimi	and	Saguenay.
2	"	"	"	"	"	"	Drummond.		
4	"	"	"	"	"	"	Maskinongé.		
3	"	"	"	"	"	"	Richelieu.		
2	"	"	"	"	"	"	Shefford.		
1	was	"	"	"	"	"	Temiscouata.		

ONTARIO.

2 killed at first test, valued at \$235.00, at a cost of \$156.66.

2 showed clinical symptoms.

902 horses were tested with mallein of which 2 reacted and were destroyed. Of the 2 reactors, 2 showed clinical symptoms of glanders at or during the test.

2 horses are under control for retest.

Of the 2 horses slaughtered—

1 was in the electoral district of Frontenac.

1 " " Ontario (N.R.).

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MANITOBA.

19 killed at first test.

1 " second test.

—

20, valued at \$2,670.00, at a cost of \$1,780.00.

6 showed clinical symptoms.

1,735 horses were tested with mallein of which 20 reacted and were destroyed. Of the 20 reactors, 6 showed clinical symptoms of glanders at or during the test.

No horses are under control for retest.

Of the 20 horses slaughtered—

9 were in the electoral district of Dauphin.

2 " " Lisgar.

9 " " Portage la Prairie.

SASKATCHEWAN.

167 killed at first test.

21 " second test.

1 " third test.

—

189, valued at \$28,605, at a cost of \$19,070.

71 showed clinical symptoms.

4,715 horses were tested with mallein of which 189 reacted and were destroyed. Of the 189 reactors, 71 showed clinical symptoms of glanders at or during the test.

20 horses are under control for retest.

Of the 189 horses slaughtered—

8 were in the electoral district of Assiniboia.

7 " " Battleford.

27 " " Humboldt.

17 " " Mackenzie.

86 " " Moosejaw.

33 " " Regina.

11 " " Saskatoon.

ALBERTA.

4 killed on inspection.

80 killed at first test.

13 " second test.

2 " third test.

—

99, valued at \$13,420.00, at a cost of \$8,946.66.

37 showed clinical symptoms.

2,589 horses were tested with mallein of which 95 reacted and were destroyed. Of the 95 reactors, 33 showed clinical symptoms of glanders at or during the test.

No horses are under control for retest.

Of the 99 horses slaughtered—

4 were in the electoral district of Calgary.

7 " " Edmonton.

26 " " Macleod.

48 " " Medicine Hat.

8 " " Red Deer.

6 " " Strathcona.

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BRITISH COLUMBIA.

2 killed at first test, valued at \$215.00, at a cost of \$143.33.

2 showed clinical symptoms.

1,590 horses were tested with mallein of which 2 reacted and were destroyed. Of the 2 reactors, 2 showed clinical symptoms of glanders at or during the test.

No horses are under control for retest.

Of the 2 horses slaughtered—

1 was in the electoral district of Vancouver.

1 “ “ Yale-Cariboo.

YUKON.

15 horses were tested with mallein and proved to be healthy.

HOG CHOLERA.

The losses occasioned by this disease in 1913 have been surpassed by the year 1914, and I regret to report that in the Dominion some 9,900 hogs were slaughtered as diseased or in contact with the disease, at a cost of \$61,588.44 in compensation. These figures are much higher than we could wish, but their loss must be looked upon as the price we have to pay for keeping the rest of our hogs healthy, and as the hog population of Canada is approximately 8,000,000, the loss of even ten thousand is not high.

The policy of slaughter of all affected herds has been pursued as before, and as a proof of its efficiency we may cite the fact that the disease rarely breaks out a second time on premises where it has been extirpated. The vast majority of the outbreaks occur on premises where the disease was previously unknown, showing the possibility of entirely eradicating the disease if fresh sources of infection could be controlled.

The feeding of uncooked garbage to hogs continues to be, in many cases, the cause of the initial outbreak. From this starting point the disease quickly spreads to adjoining premises, and may attain large dimensions before it has been brought under control. The neglect of owners to notify the department of the existence of the disease is the chief reason for this, and arises generally from ignorance of the proper course to pursue when hogs are first noticed to be sick. In some cases, however, there is reason to think that owners are loath to report cases of disease for fear of the loss they may be called upon to sustain if hog cholera is found to exist and their herd is destroyed. A more liberal valuation of hogs slaughtered would tend to remove this objection on the part of owners to promptly report suspicious cases, and in my opinion would save the department more than it would cost, besides removing a cause of dissatisfaction with our policy.

As some criticism has appeared from time to time directed against our system of dealing with this disease by slaughtering affected animals as well as those in contact with them, and advocating the methods used in the United States some explanation of our reasons for preferring our present system will be in order.

In dealing with hog cholera by immunization, two methods may be used. The serum alone method consists in injecting into the hog it is desired to protect a dose of serum, obtained from the blood of another hog which has been artificially rendered exceedingly resistant to the disease. Such a hog is known as a hyper-immune and a dose of its serum injected into a susceptible hog will render it also immune to hog cholera. The immunity conferred in this way is, however, of short duration, and disappears after a time, leaving the hog as ready to contract the disease as before.

In order to obtain a lasting immunity, the simultaneous or double system is adopted. This involves the injection of virulent or highly infective blood at the same time that the protective serum is injected. When the dose of each is properly pro-

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portioned to the weight of the hog, and the serum and virus are both of requisite strength, a degree of immunity is produced that lasts much longer than when serum alone is used.

If it were practicable to thus render all the hogs in a country immune, there is no doubt that the disease could in that way be controlled, but it would have to be continued indefinitely, for the immunity of the sow is not conferred on its young, and these would die of the disease unless also immunized. In order to obtain the necessary serum and virus the disease must be kept alive in the laboratories where these agents are prepared, and consequently the country adopting this method will always have the disease.

The experience of such countries shows that instead of controlling the disease, immunization methods tend to render it more widespread. Active virus has been sent out from laboratories directly to farmer with instructions how to use it; the accompanying serum has failed to give the protection expected, and fresh outbreaks have occurred. Even when the necessary immunity has been produced the danger is not over. The immunized hog, while protected against the disease itself, harbours the germs for an unknown period and, if brought into contact with susceptible hogs, is capable of communicating the disease.

I am convinced that the simultaneous method of immunization has done more to spread hog cholera in the United States than any other agent, and although our losses from this disease are heavy, I believe they would be still heavier under that system.

STATISTICS.

NEW BRUNSWICK.

One outbreak of hog cholera occurred in New Brunswick, in which 9 hogs, valued at \$117 were destroyed in the undermentioned district at a cost of \$78 in compensation.

Two premises were also quarantined on suspicion, involving the control of 159 hogs.

	No. of outbreaks.	Hogs destroyed.
Westmoreland.....	1	9

QUEBEC.

Twenty-seven outbreaks of hog cholera occurred in Quebec, in which 440 hogs, valued at \$6.912, were destroyed in the undermentioned districts, at a cost of \$4,607.93 in compensation.

Fifty-four premises were also quarantined on suspicion, involving the control of 659 hogs.

One hog, valued at \$12, was destroyed for purposes of examination, but no evidence of hog cholera was found.

District.	No. of outbreaks.	Hogs destroyed.
Brome	6	70
Compton.....	4	11
Missisquoi.....	16	190
Quebec	1	169
	27	440

ONTARIO

Ninety-six outbreaks of hog cholera occurred in Ontario, in which 2,016 hogs, valued at \$19,671, were destroyed in the undermentioned districts, at a cost of \$13,114 in compensation.

Fifty-nine premises were also quarantined on suspicion, involving the control of 1,051 hogs.

Three hogs, valued at \$22 were destroyed for purposes of examination, but no evidence of hog cholera was found.

District.	No. of outbreaks.	Hogs destroyed.
Algoma.....	1	36
Brantford.....	1	12
Essex (N.R.).....	45	673
Essex (S.R.).....	19	639
Kent (W.R.).....	2	38
Lanark.....	1	8
London.....	7	128
Middlesex (E.R.) ..	1	47
Nipissing.....	7	136
Ontario (S.R.) ..	3	42
Oxford (N.R.).....	1	48
Peel.....	1	16
Welland	1	40
York (C.R.).....	6	153
	96	2,016

MANITOBA.

Twenty outbreaks of hog cholera occurred in Manitoba, in which 402 hogs, valued at \$4,447.50, were destroyed in the undermentioned districts, at a cost of \$2,964.95 in compensation.

Twenty premises were also quarantined on suspicion, involving the control of 279 hogs.

District.	No. of outbreaks.	Hogs destroyed.
Dauphin.....	8	43
Lisgar.....	9	194
Macdonald.....	2	32
Selkirk.....	1	133
	20	402

SASKATCHEWAN.

Two hundred and eighty-three outbreaks of hog cholera occurred in Saskatchewan, in which 3,791 hogs, valued at \$32,622.13, were destroyed in the undermentioned districts, at a cost of \$21,348.08 in compensation.

One hundred and sixty-four premises were also quarantined on suspicion, involving the control of 1,756 hogs.

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Thirty-four hogs, valued at \$264.90 were destroyed for purposes of examination, but no evidence of hog cholera was found.

District.	No. of outbreaks.	Hogs destroyed.
Assiniboia.....	83	694
Battleford.....	9	239
Humboldt.....	16	257
Moose Jaw.....	153	2,071
Qu'Appelle.....	1	27
Regina.....	2	41
Saskatoon.....	19	162
	283	3,791

ALBERTA.

Fifty-four outbreaks of hog cholera occurred in Alberta in which 2,393 hogs, valued at \$20,731.75, were destroyed in the undermentioned districts at a cost of \$13,821.16 in compensation.

Fifty premises were also quarantined on suspicion, involving the control of 2,139 hogs.

Twenty-three hogs, valued at \$262, were destroyed for purposes of examination, but no evidence of hog cholera was found.

District.	No. of outbreaks.	Hogs destroyed.
Calgary.....	9	143
Edmonton.....	15	481
Macleod.....	4	424
Medicine Hat.....	19	1,182
Red Deer.....	1	77
Strathcona.....	6	86
	54	2,393

BRITISH COLUMBIA

Fifty-three outbreaks of hog cholera occurred in British Columbia, in which 849 hogs, valued at \$8,481.50, were destroyed in the undermentioned districts, at a cost of \$5,654.32 in compensation.

Forty-five premises were also quarantined on suspicion, involving the control of 1,440 hogs.

Three hogs, valued at \$24.98 were destroyed for purposes of examination, but no evidence of hog cholera was found.

District.	No. of outbreaks.	Hogs destroyed.
Comox-Atlin.....	3	77
Kootenay.....	4	76
Nanaimo.....	17	91
New Westminster.....	19	409
Vancouver.....	3	45
Yale-Cariboo.....	7	151
	53	849

DOURINE.

The prospect of an early eradication of this disease has been dimmed by the unfortunate experience of the past year. An outbreak of large proportions was detected during the summer in a herd of range horses south of Lethbridge, Alta. Prompt measures were taken to deal with it. All range horses in the district were placed under restrictions, and an examination of every mare and stallion undertaken. Samples of blood were taken by our inspectors and sent to the laboratory at Lethbridge, where they were submitted to the complement fixation test by our pathologist, Dr. A. Watson, and his assistants.

It soon became evident that we had to deal with an outbreak of far greater proportions than any that had preceded it. A vast amount of work was required to round up the range horses, take samples of blood, make tests, trace movements of mares sold into other districts, and to follow up every line of infection to its end. This work was carefully and energetically carried out by our officers in Alberta, and while all are deserving of praise for their diligence, I wish specially to mention Inspectors Watson and Hawke for arduous and tedious work of the laboratory, which they performed with diligence and care; and also Inspectors Gallivan and Busselle, who did much of the work in the field. The services of Inspector Hargrave in this matter were also of great value to the department.

As a result of this work a large number of infected mares and stallions were found. These were all destroyed, and we have reason to hope that the worst of the trouble is over. Careful supervision of the district will be maintained, and no stallion will be used for breeding purposes until tested and found free from disease.

STATISTICS.

Four hundred and seventy-one animals, valued at \$73,115, were slaughtered as being affected with this disease, at a cost of \$48,743.33 distributed as follows:—

SASKATCHEWAN.

District.	Suspected and quarantined.	Slaughtered.
Battleford.....		9
Humboldt	5	
Moose Jaw.....	67	1
Qu'Appelle.....		1
Regina.....	7	1
	79	12

ALBERTA.

District.	Suspected and quarantined.	Slaughtered.
Calgary	21	6
Macleod	40	23
Medicine Hat.....	4,330	430
Red Deer.....	6	
	4,397	459

CATTLE MANGE.

The statistics of this disease show that progress is being made, the number of outbreaks and of animals affected showing a considerable diminution compared with the year before.

STATISTICS.

Province.	Outbreaks.	Animals affected.	Animals quarantined.
Nova Scotia.....	1	5	5
Saskatchewan.....	16	181	8,178
Alberta.....	104	2,538	53,303
British Columbia.....			663
	121	2,724	62,149

49,503 cattle and 2 buffaloes were inspected on being presented for shipment from the quarantined areas in Saskatchewan and Alberta.

106,576 cattle were inspected in Winnipeg on arrival from points west thereof.

HORSE MANGE.

This disease continues to furnish a moderate number of outbreaks, pretty well distributed over the country from east to west. As this disease is not often looked upon by horse owners with any apprehension, it often goes without notification to the department until it has spread to such an extent as to cause alarm. On this account it is more difficult to exterminate than much more serious maladies.

STATISTICS.

Province.	Outbreaks.	Animals affected.	Animals quarantined.
Quebec.....	10	13	20
Ontario.....	44	96	419
Manitoba.....	3	13	44
Saskatchewan.....	31	177	227
Alberta.....	10	106	928
	98	405	1,638

11,886 horses and 227 mules were inspected on being presented for shipment from the quarantined area in Alberta and Saskatchewan.

RABIES.

Ontario and British Columbia were the only provinces in which rabies made its appearance during the year. Prompt measures were taken to have all dogs in infected localities tied up or muzzled, and no fatalities are reported in human beings from this dread disease.

STATISTICS.

In *Ontario*, 56 premises were quarantined on account of the prevalence of rabies in the adjacent districts, distributed as follows:—

District.	Premises quarantined.
Huron.....	5
Northumberland.....	5
Peel.....	11
Simcoe.....	2
Waterloo.....	2
Wellington.....	2
York.....	29
	56

In *British Columbia*, 18 premises were quarantined on account of the prevalence of rabies in the adjacent districts, distributed as follows:—

District.	Premises quarantined.
Nanaimo.....	13
New Westminster.....	5
	18

SHEEP SCAB.

Apart from a small outbreak in Quebec, and a slightly larger one in Manitoba, the country was entirely free from this disease. The Manitoba outbreak was peculiar in occurring in a remote district inhabited by Icelanders, where it was impossible to discover any probable source of infection.

STATISTICS.

In *Quebec*, 38 sheep on two premises were quarantined, 4 being affected with sheep scab, distributed as follows:—

District.	Affected.	Quarantined.
Yamashet.....	4	38

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In *Manitoba*, 399 sheep on thirteen premises were quarantined, 200 being affected with sheep scab, distributed as follows:—

District.	Affected.	Quarantined.
Dauphin.....	200	317
Lisgar.....	.....	52
	200	399

In accordance with the Quarantine Regulations, 11,002 sheep imported into Canada were quarantined for the prescribed period of thirty days.

SCABIES IN FOXES.

Two foxes were found affected with this disease in Prince Edward Island, involving the control of 30 animals on five premises.

TUBERCULOSIS.

No change having been made in the Dominion regulations, there is no satisfactory progress to be reported in connection with the disease. We continue to test cattle for export to the United States and to British Columbia, and we also test a number of herds for owners who have voluntarily placed them under our control, and in this way are gaining experience in dealing with it.

There is no doubt that the disease is widespread and more contagious than is generally thought by stockmen. The evidence of this is found in the large number of hogs found tuberculous on post-mortem examination in our abattoirs. These hogs contract the disease from tuberculous cows in two ways, by drinking milk or whey carrying the infection, or else by running in the same yard or stable with cows. Investigation has shown that the manure of tuberculous cows is highly infective. Hogs that are allowed to root over manure are almost certain to become affected if there is tuberculosis in the herd. When many hogs are found diseased, it is safe to assert that cattle are largely affected, and our statistics prove that tuberculosis of hogs is on the increase.

Farmers could avoid this loss by testing their herds and getting rid of reactors, or if this is impossible, it might be diminished by keeping the pigs away from the cows or their manure, and by boiling any milk, buttermilk, or whey fed to them.

STATISTICS.

Five hundred and eighteen cattle were tested on being imported into Canada, 16 of which reacted, 5 were classed as suspicious, and 497 proved healthy.

One thousand seven hundred and fifty-nine cattle were tested for export, 88 of which reacted, 8 were classed as suspicious and 1,663 proved healthy.

Two thousand eight hundred and thirty-two cattle were tested, some for shipment to different provinces of the Dominion, and other in herds under the supervision of this department, 304 of which reacted, 87 were classed as suspicious, and 2,441 proved healthy.

Three thousand seven hundred and twenty cattle were tested by private practitioners, 346 of which reacted, 76 were classed as suspicious, and 3,298 proved healthy.

All reactors were permanently earmarked by a veterinary inspector in cases where the owner did not voluntarily destroy them.

ANTHRAX.

A few outbreaks of anthrax occurred during the year and were dealt with by immunizing the exposed animals with vaccine prepared at our laboratory.

Black-leg vaccine was in great demand during the year.

STATISTICS.

The following outbreaks were reported and dealt with during the year:—

Province.	Outbreaks.	Animals quarantined.
Quebec.	15	386
Ontario.	5	81
British Columbia.	1	
	21	467

Four hundred and eighty-six doses of Anthrax vaccine, and 38,871 doses of Black-leg vaccine were distributed during the year.

LABORATORIES.

The principal laboratory of the branch is the Biological Laboratory at the Central Experimental Farm, Ottawa, which has been for many years under the charge of C. H. Higgins, D.V.S. Here are prepared the various vaccines and other biological products used in the control and detection of contagious diseases of animals. Tuberculin, mallein, vaccines for anthrax, blackleg, strangles, etc., are prepared, tested, bottled, and sent out.

As the accuracy of diagnosis depends in many cases upon the reliability of the test fluid used, it is most important that every care should be taken that such fluids as tuberculin and mallein should be thoroughly trustworthy. The method of testing tuberculin, on laboratory animals, not seeming to me sufficiently practical and reliable, I have adopted a new method. A large number of cattle, say fifty, that are about to be killed at one of the large abattoirs, are held and tested by our officers with the tuberculin on trial. After the test is completed, the animals are all slaughtered, and the results of post-mortem examination compared with the tuberculin test. Unless the tuberculin is accurate in picking out all the tuberculous animals, it is condemned, and further trials made until a satisfactory result is attained. All our tuberculin is tested in this way at the present time, and I think is as reliable as can be made.

At this laboratory a considerable amount of research work is done, and there will be found elsewhere in this report some account of an investigation into the nature and cause of black-head in turkeys. Pathological specimens sent in by our inspectors and others are received and examined for diagnosis.

The Lethbridge (Alta.) laboratory, under the charge of Dr. Watson, has been doing excellent work in the diagnosis of dourine. The extensive outbreak in southern Alberta, already mentioned, has entailed the examination of thousands of blood samples taken from suspected mares and stallions.

The test employed, the complement fixation test, is extremely delicate and complicated, requiring the greatest skill and care in its application. In the hands of Dr. Watson and his assistants it has demonstrated, again and again, its wonderful accuracy. While not infallible, the test seldom makes a mistake, and has enabled the department to deal with this outbreak of dourine in a scientific manner.

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Swamp fever experiments have been continued, chiefly along the line of discovering a laboratory test by which the disease can be diagnosed before reaching an advanced stage. The usual symptoms of this disease are not seen until it has made some progress, and in many cases the victim is then beyond the aid of treatment. A test for it, such as the complement fixation test for dourine, or the mallein test for glanders, would be a great step in advance, and might lead to rational methods of control. Progress has been made in this search, but at present no definite results are to be reported.

At Agassiz, B.C., we maintain a small laboratory on the Experimental Farm there. Dr. Seymour Hadwen is in charge, and has been devoting himself to the investigation of red water in cattle, and other matters affecting the health of live stock. His report appended hereto is of interest.

QUARANTINES.

A new quarantine ground has been acquired at Lévis, Que., and progress made in fencing and erecting buildings. A piece of land comprising some 127 acres was bought, on the south shore of the St. Lawrence, about 6 miles west of Point Lévis, and 3 miles from the old quarantine ground. On the north, this land extends to the track of the Intercolonial railway, and a spur has been constructed so that cattle can be unloaded from the cars within our own grounds, thus removing the great objection to the former arrangement, where cattle entering quarantine had to traverse the public highway.

As many of the old buildings as are fit to move will be transferred to the new quarantine, and others erected as may be necessary from time to time, until we have all the accommodation required for taking care of the shipments received from England, sometimes in large numbers. Sufficient progress has already been made in this work to indicate that the new quarantine will be a great improvement over the last, satisfactory to importers and creditable to the department.

At other points where quarantines are maintained, some minor improvements have been made and the property of the department maintained in good condition.

IMPORT TESTING.

7,877 horses were tested on arrival from the United States, and allowed to proceed to their destination.

Entered at—	Number.	Entered at—	Number.
Charlottetown, P.E.I.	1	Rainy River, Ont.	15
Halifax, N.S.	3	Sarnia, Ont.	123
Yarmouth, N.S.	17	Sault Ste. Marie, Ont.	19
Aroostook Jct., N.B.	51	Toronto, Ont.	2
Debec Jct., N.B.	5	Windsor, Ont.	317
Edmundston, N.B.	15	Bannerman, Man.	95
Florenceville, N.B.	4	Emerson, Man.	1,031
Grand Falls, N.B.	14	Gretna, Man.	287
McAdam Jct., N.B.	19	Snowflake, Man.	136
St. John, N.B.	15	Sprague, Man.	2
St. Leonards, N.B.	24	Big Muddy, Sask.	215
St. Stephen, N.B.	25	Maple Creek, Sask.	2
Woodstock, N.B.	9	Marienthal, Sask.	117
Abercorn, Que.	23	Northgate, Sask.	7
Athelstan, Que.	30	North Portal, Sask.	1,517
Beauceville, Que.	104	Saskatchewan General.	2
Beebe Jct., Que.	52	Willow Creek, Sask.	138
Coaticook, Que.	9	Wood Mountain, Sask.	631
Comin's Mills, Que.	12	Coutts, Alta.	387
Dundee, Que.	21	Pinhorn, Alta.	24
Highwater, Que.	18	Twin Lakes, Alta.	228
Lacolle Jct., Que.	31	Bridesville, B.C.	128

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Entered at—	Number.	Entered at—	Number.
Lake Megantic, Que.	50	Gateway, B.C.	60
Montreal, Que.	9	Grand Forks, B.C.	194
Noyan, Jct., Que.	11	Huntingdon, B.C.	149
St. Agnes de Dundee, Que.	8	Keremeos, B.C.	69
St. Armand, Que.	21	Kingsgate, B.C.	337
St. Johns, Que.	11	Midway, B.C.	46
Sherbrooke, Que.	39	Myncester, B.C.	42
Bridgburg, Ont.	100	Nelson, B.C.	23
Brockville, Ont.	8	Osoyoos, B.C.	353
Cornwall, Ont.	16	Rossland, B.C.	41
Fort Frances, Ont.	139	Rykerts, B.C.	24
Kingston, Ont.	9	Vancouver, B.C.	32
Morrisburg, Ont.	11	Victoria, B.C.	11
Niagara Falls, Ont.	65	White Rock, B.C.	38
Port Arthur, Ont.	8	White Horse, Y.T.	13
Prescott, Ont.	15		

IMPORT INSPECTIONS FROM UNITED STATES AND NEWFOUNDLAND.

Port.	Horses.	Mules.	Cattle.	Sheep.	Swine.	Goats.	Asses.	Elk.	Ele- phant's.
Charlottetown, P.E.I.	2		1	22					
Halifax, N.S.	11	1	1	2					
Sydney, N.S.	21								
Yarmouth, N.S.	28		4	10					
St. John, N.B.	30			316	6				
St. Stephen, N.B.	72		9				2		
McAdam Junction, N.B.	31		26	66					
Debec Junction, N.B.	5								
Woodstock, N.B.	9								
Florenceville, N.B.	4			13					
Aroostook Junction, N.B.	54		9	27					
Grand Falls, N.B.	16								
St. Leonard, N.B.	24								
Edmundston, N.B.	15		1						
N. B. General.	5								
Comin's Mills, Que.	12		3						
Lake Megantic, Que.	48	4							
Beauceville, Que.	130								
Coaticook, Que.	9								
Beebe Junction, Que.	66		8						
Sherbrooke, Que.	87			27					
Highwater, Que.	56		4						
Abercorn, Que.	40		2						
St. Armand, Que.	216	13	30	19					
Lacolle Junction, Que.	416	3	26						
Noyan Junction, Que.	80	7	29			5			
St. Johns, Que.	13	33	1						
Montreal, Que.	1								
Athelstan, Que.	151	1	14	4		1			
Dundee, Que.	50		124						
St. Agnes de Dundee, Que.	39		2						
Cornwall, Ont.	37								
Prescott, Ont.	130		12			1			
Morrisburg, Ont.	28								
Brockville, Ont.	11		11	1		6			
Kingston, Ont.	25		2						
Toronto, Ont.	42								
Niagara Falls, Ont.	326	14	46	564		6			
Ladysburg, Ont.	828	6	13	3,171					
Windsor, Ont.	1,312	41	144	70	31	10		1	5
Sarnia, Ont.	318	23	118	2,516	3	5			
Sault Ste. Marie, Ont.	33		5	1		7			
Port Arthur, Ont.	8								
Rainy River, Ont.	17		2						
Port Frances, Ont.	210	2	50		4	4			
Lambton, Man.	5,629	468	1,548	13,084	128	19			
Gresham, Man.	949	192	219	20,741		5			
Snow Lake, Man.	146		22						
Rainbow, Man.	260	3	88	1,895	1	5			
Carried forward.	12,050	811	2,564	42,549	173	72	2	1	5

SESSIONAL PAPER No. 15b

IMPORT INSPECTIONS FROM UNITED STATES AND NEWFOUNDLAND—*Concluded.*

Port.	Horses.	Mules.	Cattle.	Sheep.	Swine.	Goats.	Asses.	Elk.	Ele- phants.
Brought forward ...	12,050	811	2,564	42,549	173	72	2	1	5
Manitoba General.	2	.....	3	.....	.....	.....	.....	.....	.....
North Portal, Sask.....	8,599	554	4,930	196	18	9	11	.....	.....
Northgate, Sask.	94	4	15	.....	.....	.....	.....	.....	.....
Marienthal, Sask.	276	7	47	.....	.....	.....	.....	.....	.....
Wood Mountain, Sask..	1,420	28	51	8,803	.....	.....	.....	.....	.....
Big Muddy, Sask.	1,063	27	40	.....	.....	.....	.....	.....	.....
Willow Creek, Sask.....	211	4	.....	3,462	.....	.....	.....	.....	.....
Saskatchewan General..	4	.....	.....	.....	.....	.....	.....	.....	.....
Pinhorn, Alta.....	48	5	12	7,699	.....	.....	.....	.....	.....
Countts, Alta.....	677	27	5,265	79,273	6	.....	.....	.....	.....
Twin Lakes.....	235	4	25	.....	.....	.....	.....	.....	.....
Gateway, B.C....	235	21	7	.....	10	.....	.....	.....	.....
Kingsgate, B.C.	1,667	69	172	4,729	.....	.....	.....	.....	.....
Nelson, B.C.....	26	2	21	.....	.....	.....	.....	.....	.....
Rykerts, B.C.	25	.....	.....	.....	.....	.....	.....	.....	.....
Rossland, B.C.....	65	.....	56	476	.....	.....	.....	.....	.....
Grand Forks, B.C.....	167	7	315	400	61	2	.....	.....	.....
Midway, B.C.....	102	.....	28	3,102	.....	.....	.....	.....	.....
Myncaster, B.C.....	40	.....	1	.....	.....	.....	.....	.....	.....
Bridesville, B.C.....	126	4	38	.....	.....	.....	.....	.....	.....
Keremeos, B.C.....	103	2	3	162	1	.....	.....	.....	.....
Osoyoos, B.C.	416	12	48	185	.....	.....	.....	.....	.....
Huntingdon, B.C.....	693	29	139	7,018	8	665	2	.....	.....
New Westminster, B.C..	.....	.....	9	.....	.....	.....	.....	.....	.....
White Rock, B.C.....	932	11	56	25,792	3	8	6	5	.....
*Vancouver, B.C.....	204	12	20	28,224	.....	58	1	2	.....
Victoria, B.C.	125	1	28	845	.....	8	.....	.....	.....
White Horse, Y.T.....	108	.....	854	417	94	.....	.....	.....	.....
Yukon General.....	13	.....	.....	.....	.....	.....	.....	.....	.....
Total.....	29,726	1,641	14,747	213,332	374	822	22	8	5

¹ Russian Sables..2. * 8 peccaries.

IMPORT INSPECTIONS FROM EUROPE AND ELSEWHERE.

Port.	Horses.	Mules.	Cattle.	Sheep.	Swine.	Goats.	Deer.	Asses.
Sydney, N.S. ....	.....	1	.....	.....	.....	.....	.....	.....
St. John, N.B.....	241	.....	2	8	9	.....	.....	.....
Quebec, Que.....	11	.....	237	458	29	1	2	.....
Montreal, Que.....	769	.....	.....	.....	.....	.....	.....	5
Athelstan, Que.....	1	.....	.....	.....	.....	.....	.....	.....
Prescott, Ont.....	12
Niagara Falls, Ont.....	5	2
Bridgeburg, Ont	54	1	27	1
	1,093	1	242	493	39	1	2	5

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DISEASED IMPORTS.

Port.	No. of Horses in Infected Shipments.	No. of Shipments.	No. of Horses Diseased.	Country of Origin.	Action.
Amosook Junction, N.B.	2	1	1	U. S.	Returned.
Marrishburg, Ont.	7	1	1	"	"
Kingston, Ont.	2	1	1	"	"
Gretna, Man.	17	3	3	"	"
Snowflake, Man.	16	1	1	"	"
Bannerman, Man.	11	2	2	"	"
² North Portal, Sask.	122	28	34	"	"
Northgate, Sask.	8	1	1	"	"
Marienthal, Sask.	18	2	2	"	"
Wood Mountain, Sask.	23	2	3	"	"
Big Muddy, Sask.	17	4	4	"	"
Coutts, Alta.	8	4	4	"	"
Kingsgate, B.C.	2	1	1	"	"
Grand Forks, B.C.	1	1	1	"	"
Bridesville, B.C.	2	1	1	"	"
³ Osoyoos, B.C.	61	5	18	"	"
Huntingdon, B.C.	2	1	1	"	"
Victoria, B.C.	13	1	1	"	"
	332	60	80		

¹ 402 sheep in one shipment rejected, 3 being affected with sheep scab.

² Two horses rejected for mange.

³ Four horses in one shipment rejected, 1 being affected with dourine. Affected animal destroyed.

At Abercorn, Que., 1 cow was rejected and destroyed, being affected with tuberculosis.

At White Rock, B.C., 1 cow was rejected, being affected with tuberculosis.

PURE-BRED IMPORTS.

HORSES.

Breed.	Great Britain.	United States.	Elsewhere.	Total.
Belgian		14	33	52
Clydesdale	437	4		441
French Coach	2	3		5
German Coach		1		1
Hackney	57	2		59
Highland	1			1
Hunter	6			6
Percheron	3	89	133	225
Polo Pony	8			8
Ponies	156			156
Shetland	178	10		188
Shire	30			30
Standard bred		94		94
Suffolk	6			6
Thoroughbred	5	4		9
Trotting bred		3		3
Welsh	23			23
	912	224	171	1,307

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CATTLE.

Breed.	Great Britain.	United States.	Total.
Ayrshire.....	105	12	117
Durham.....	1	2	3
Galloway.....	13		13
Guernsey.....	5	9	14
Hereford.....		22	22
Holstein.....		31	31
Jersey.....	40	24	64
Polled Angus.....	4	16	20
Red Polled.....		28	28
Shetland.....	5		5
Shorthorn.....	67	30	97
West Highland.....	3		3
	243	174	417

SWINE.

Breed.	Great Britain	United States.	Total.
Berkshire.....	27	2	29
Chester White.....		14	14
Duroc Jersey.....		17	17
Hampshire.....		1	1
Lincoln Curly Coated.....	1		1
Poland China.....		28	28
Yorkshire.....	11		11
	39	62	101

SHEEP.

Breed.	Great Britain.	United States.	Total.
Cheviot.....	43	5	48
Cotswold.....	14		14
Dorset.....	111		111
Hampshire.....	75	38	113
Karakul.....		22	22
Leicester.....	37	7	44
Lincoln.....	1		1
Oxford.....	37	7	44
Persian.....		1	1
Rambouillet.....		1	1
Shropshire.....	126		126
Southdown.....	47		47
Suffolk.....	2		2
	493	81	574

GOATS.

Breed.	United States.
Angora.....	7
Swiss.....	2
	9

ANIMALS INSPECTED FOR EXPORT.

Port.	Horses.	Mules.	Cattle.	Sheep.	Swine.	Buffalo.
St. John to Great Britain.	1			100		
Montreal to Great Britain.	127		432			2
Toronto to Great Britain.			7,409			
Bridgetown to Great Britain.			506			
Montreal to Great Britain via Boston.			776			
Charlottetown to United States.	1					
Halifax to United States.	6					
Toronto to United States.			83,819			
St. John to South Africa.	15	75				
Quebec to South Africa.				80		
Montreal to South Africa.	7	177	31	296		
Charlottetown to Newfoundland.	53		1,420	827	96	
Summerside to Newfoundland.	1		216	383	1	
Bayfield to Newfoundland.	22		147	36		
Mulgrave to Newfoundland.	22		402	172	2	
Sydney to Newfoundland.	140		1,210	649	146	
Toronto to Newfoundland.			31			
Sydney to St. Pierre and Miquelon.	1		122	208	24	
Halifax to St. Pierre and Miquelon.			14		14	
Halifax to Bermuda.	17		30		14	
Toronto to Bermuda.			286			
Halifax to Jamaica.			2	33		
Montreal to New Zealand.			51			
Vancouver to New Zealand.	7					
	420	252	96,934	3,184	297	2

EXPORT ANIMALS REJECTED AT THE FOLLOWING PORTS.

Port.	Cattle.
Montreal.	8
Toronto.	31
	39

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STAFF.

Several changes have taken place in the personnel of the staff, the increase of work necessitating the appointment of additional inspectors, and the filling of places rendered vacant by deaths and resignations.

APPOINTMENTS.

Veterinary Inspectors.

G. R. Brewster, V.S.,
H. L. Cass, V.S.,
G. C. Cockerton, V.S.,
C. H. Drake, V.S.,
J. J. Farrell, V.S.,
R. Gilmour, V.S.,
W. A. Hilliard, V.S.,
G. Hoey, V.S.,
A. Hobbs, V.S.,
J. T. M. Hughes, M.R.C.V.S.,
(re-appointed).

G. S. Jermyn, V.S.,
J. Lee, V.S.,
R. W. MacDonald, V.S.,
W. F. Macdougall, V.S.,
W. D. MacCormick, V.S.,
D. H. McFadden, V.S.,
A. R. Munroe, V.S.,
A. Moore, V.S.,
I. Pasley, V.S.

Inspectors.

R. DeCock,
H. DeCock,
A. Hoey,
G. Holmes,

M. Rodgers,
J. Temple,
C. A. Waterman,
J. J. Marshall.

Clerks (Outside).

W. Morse,

Miss L. Cook.

TRANSFERS.

D. R. Bone, V.S. (to Meat Inspection Division).

RESIGNATIONS.

Veterinary Inspectors.

D. Coristine, V.S.,
R. B. Coutts, V.S.,
C. H. Drake, V.S.,
C. Head, V.S.,

G. Hoey, V.S.,
H. S. Manhard, V.S.,
R. D. McIntosh,
P. R. Talbot, V.S.

Inspectors.

H. Bull,
E. N. Macduffee.

R. DeCock,
J. C. Dafoe,

Clerks (Outside).

F. Smith,

Miss B. Creswell.

SERVICES DISPENSED WITH.

Inspectors.

A. Duck,
H. Currie,
C. Evans,

H. M. McNaughton,
E. Noble,
Thos. Scott,

MEAT AND CANNED FOODS DIVISION.

The administration of the "Meat and Canned Foods Act" is placed in the hands of the Veterinary Director General, and is under the supervision of Dr. Barnes, whose report is printed herewith. The development of the meat trade has rendered necessary some increase in our staff, and we have been fortunate in securing the services of men well qualified for this technical work. The value of our examination of candidates for appointment is amply demonstrated, and I wish such an examination could be extended to include lay inspectors as well as veterinary.

STATISTICS.

Chief, Meat and Canned Foods Division.. . . .	R. Barnes, V.S.
Travelling Inspector.. . . .	H. H. Ross, V.S.
Chief Inspector of Canneries.. . . .	C. S. McGillivray. { W. A. D. Graham.
Canning Inspectors.. . . .	{ A. Bowlby. { H. St. J. Switzer.
Inspector of Condensed Milk Factories.. . . .	F. W. Baungartner.
In charge of Toronto.. . . .	L. A. Willson, V.S.
In charge of Montreal.. . . .	M. J. Kellam, V.S.
In charge of Winnipeg.. . . .	C. D. McGilvray, M.D.V.
In charge of Prince Edward Island.. . . .	W. H. Pethick, V.S.
Special duty at Biological Laboratory, Ottawa.. . .	J. C. Reid, M.V.
Special duty at Biological Laboratory, Lethbridge..	W. A. Hilliard, D.V.S. { J. H. Shonyo, V.S.
Transferred temporarily to Field Work.. . . .	{ H. Pomfret, V.S.
On Transfer.. . . .	A. C. Tanner, V.S. { A. J. G. Hood, M.V.
Leave of Absence.. . . .	{ A. C. Lundie, V.S. { J. H. Pringle, M.R.C. V.S. { W. R. Monroe, V.S.
Sick Leave.. . . .	{ F. A. Daigneault, M.V. { W. J. Blainey.

ADDITIONS TO STAFF.

Veterinary Inspectors.	Lay Inspectors.	Canning Inspectors.
C. J. Bousfield, V.S. H. B. Collett, V.S. K. L. Douglas, V.S. J. W. Fisher, V.S. E. C. Gauvin, M.V. J. G. Jervis, B.V. Sc. S. T. Law, V.S. A. G. Murray, V.S. C. W. McIntosh, V.S. L. H. Swail, V.S. J. A. Théoret, D.V.S. D. E. Tulloch, M.R.C.V.S.	C. Brind, V.S. H. W. Mallett. J. H. Mumford. H. Newton. J. T. Newton. C. E. Smith. W. G. Williams. John Wright.	A. H. Hobbs (temporary.)

TRANSFERS.

W. D. MacCormack, V.S.
A. R. Monroe, V.S.

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DEATHS.

M. W. Everett.

RESIGNATIONS.

S. T. Law, V.S.
M. H. Milton, V.S.
C. E. Edgett, V.S.

PROLONGED LEAVE OF ABSENCE.

A. C. Lundie, V.S.
A. J. G. Hood, M.V.
R. E. Murray, V.S.
W. R. Monroe, V.S.
J. H. Pringle, M.R.C.V.S.

DISMISSALS.

R. E. Murray, V.S.

ESTABLISHMENTS UNDER INSPECTION MARCH 31, 1914.

No.	Name.	Place.	Inspectors.
1	Fowler's Canadian Co., Ltd.	Hamilton	A. C. Ramsay, V.S. H. Garrett, B.V.S. J. E. A. Duhamel, M.V. J. Wright.
2B	Matthews Blackwell, Ltd.	Brantford	W. Kime, V.S. J. G. Davidson, V.S.
2C	" "	Peterborough	W. A. Henderson, V.S. W. Tennant, V.S.
10	F. W. Fearman Co., Ltd.	Hamilton	C. J. Johannes, V.S. C. S. Cain, V.S. W. A. Morrin, V.S.
11	Ingersoll Packing Co.	Ingersoll	R. D. Orr, V.S. C. L. Wallace, V.S. J. O. Guertin, M.V.
13	Whyte Packing Co., Ltd.	Stratford.	T. M. Pine, V.S. A. W. Beach, V.S.
16	Dominion Abattoir Limited	London.	W. R. Bell, V.S.
17	Jones Packing and Provision Co., Ltd.	Smith's Falls.	J. B. White, V.S.
31	O'Keefe & Drew Abattoir	Chatham	J. R. Thompson, V.S. A. A. H. Carley, V.S.
2E	Matthews-Blackwell, Ltd.	Toronto	F. A. Walsh, V.S. F. A. McNally, V.S. G. C. Brownridge, V.S. J. R. Songhurst. J. T. Newton.
4A	Wm. Davies Co., Ltd.	"	A. R. Torrie, VS. C. J. Bousfield, V.S. W. Lawson, V.S. E. R. Farewell, V.S. E. C. Gauvin, M.V. J. A. Hodgins. W. McCabe. E. E. White.
7	Harris Abattoir Co., Ltd., St. Clair Ave.	West Toronto	R. H. Cook, V.S. A. G. Murray, V.S. D. R. Bone, V.S. J. E. Morse, V.S. J. H. George, V.S. E. Cox. W. Howard. P. Kingston.
7A	Harris Abattoir Co., Ltd., Strachan Ave.	Toronto	D. A. Irvine, V.S. D. Brown.
9	Glans Limited	"	D. C. Tennent, V.S. F. L. Wingate, V.S. J. E. Bennett, V.S. J. H. Mumford. P. Kelly.
16C	Swift Canadian Co., Ltd.	"	F. H. S. Lowrey, V.S. A. C. Walker, V.S. W. J. Pedden, V.S. T. W. R. Macfarlane, V.S. H. D. Nelson, V.S. A. A. Belanger, M.V. H. Newton. E. Hunter. C. Brittain.
28	W. Wight & Co.	"	F. Fisher, V.S.
2A	Matthews-Blackwell, Ltd.	Hull, P.Q.	W. Moynihan, B.V.Sc. J. Langevin, M.V. A. W. Younghusband, V.S. J. Terrance.
2D	" " "	Montreal.	J. W. Syms, D.V.S. C. H. Weaver, B.V.Sc. O. Brunet, M.V. G. W. Walsh. H. Beaudoin.

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ESTABLISHMENTS UNDER INSPECTION MARCH 31, 1914—*Concluded.*

No.	Name.	Place.	Inspectors.
4B	Wm. Davies Co., Ltd.....	Montreal.....	A. R. Douglas, D.V.S. W. H. James, V.S. R. D. Boast, V.S. K. L. Douglas, V.S. J. R. Young. R. Benoit.
22	Montreal Union Abattoir.....	".....	C. E. Derome, M.V. S. Jaques, V.S. C. D. Bancroft, D.V.S. N. E. McEwen, B.V.Sc. J. N. L. Couture, M.V. N. W. Reid, M.V. E. Lallemand.
24	Wm. Clark, Limited.	".....	E. G. Lemieux, M.V. D. McDonald.
25	Montreal Abattoirs, Limited.....	".....	E. Dufresne, M.V. J. W. Fisher, V.S. C. W. McIntosh, V.S. J. F. Campeau, M.V. L. J. Demers, M.D., M.V. F. Maccabee.
29	N. K. Fairbank Co., Ltd.....	".....	H. Mizener.
47	Société S. P. A.....	".....	H. Macey.
18	Swift Canadian Co., Ltd.....	Winnipeg.....	J. D. Ross, V.S. F. C. Bishop, V.S. C. Brind, V.S. W. G. Williams.
19	Gordon, Ironside & Fares	".....	F. C. Jones, V.S. J. L. Trudeau, M.V. H. Colébourn, V.S. R. H. Lyon.
20	Gallagher, Holman & Lafrance.	".....	A. R. Walsh, V.S. H. J. Elliott, M.D.V. C. H. Johnston.
21	Western Packing Co.....	".....	J. R. N. Harrison, V.S. R. B. Dellert, V.S.
18 B	Swift Canadian Co., Ltd.....	Edmonton.....	J. R. English, D.V.S. J. H. Tupling, B.V.Sc. G. Whitehead, V.S.
23 A	P. Burns & Co., Ltd.	".....	I. Christian, V.S. L. H. Swail, V.S. C. S. Anderson, V.S.
23	".....	Calgary	J. A. McLeish, V.S. D. E. Tulloch, M.R.C.V.S. H. B. Collet, V.S. T. G. McClelland. C. E. Smith.
19 B	Gordon, Ironside & Fares.....	Moosejaw.....	J. W. Purdy, V.S. S. G. Bright, V.S. J. A. Théoret, M.V.
23 B	P. Burns & Co., Ltd.....	Vancouver, B.C.....	E. A. Bruce, V.S. J. Dickinson, B.V. Sc. J. G. Jervis, B.V. Sc. H. W. Mallett.
50	Davis & Fraser.....	Charlottetown, P.E.I...	T. H. Richards, V.S.

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The following establishments have been under inspection temporarily between April 1, 1913, and March 31, 1914 :—

No.	Name.	Place.
12	P.E.I. Railway	Kensington, P.E.I.
15	John Roop	Charlottetown, P.E.I.
26	Railway Freight Shed	Kerrobert, Sask.
34	Sussex Packing Co.	Sussex, N.B.
35	N.B. Cold Storage	St. John, N.B.
36	W. A. Leard	Charlottetown, P.E.I.
36b	W. A. Leard	Summerside, P.E.I.
37	Railway Freight Shed	York, P.E.I.
40	Aylmer Canning Co.	Aylmer, Ont.
41	P.E.I. Railway	Bradalbane, P.E.I.
42	P.E.I. Railway	Montague, P.E.I.
46	R. E. Mutch & Co.	Charlottetown, P.E.I.
48	Heber Hartlen	Halifax, N.S.
51	J. H. Myrick & Co	Tignish, P.E.I.
53	P.E.I. Railway	Summerside, P.E.I.
57	P. McNutt & Son	Malpêque, P.E.I.
58	J. R. Doucette	Waterford, P.E.I.
60	Fred Magee	Port Elgin, N.B.
61	W. S. Fraser	Peter's Road, P.E.I.
64	P. C. Gallant	Summerside, P.E.I.
65	Thomas Butler	Murray River, P.E.I.
66	John Munn	Murray River, P.E.I.

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DISEASES FOUND AT ESTABLISHMENTS UNDER INSPECTION.

Diseases.	CATTLE.			SHEEP.			SWINE.			Poultry.
	Car-cases.	Por-tions.	Lbs.	Car-cases.	Por-tions.	Lbs.	Car-cases.	Por-tions.	Lbs.	Lbs.
Abscess	13	28,960		15	268		12	2,284		
Actinomycosis	17	13,290			4		5	514		
Adhesions		5,306			241			3,483		
Adeno.							1			
Ascitis				1			1			
Arthritis				1			1	4		
Angiomatosis		1,866								
Bruises	342	17,159	4,201	27	876	1,334	46	8,803	41,854	
Carcinoma				4			6			
Cripples	11	155		10	38		29	5,963		
Cysts		654						159		
Cysticercus Ovis..				1	20					
" Bovis	263	268								
" Cellulosae..							217	94		
" Tenuicollis.				6	287					
Congestion		55			12			226		
Cirrhosis		9						25		
Decomposed	9	85	106,003			18,518	1		39,663	
Dirty		7	474,852		9	276		22	12,712	
Emaciation	192			81			25			
Enteritis	5			8			39			
Endo-Carditis	1									
Emphysemia		1					3	601		
Frozen								125		
Hernia		3					4	81		
Hepatitis				1			1			
Hydraemia	15			3			1			
Hydremic cachexia.							1			
Hydromata				1						
Hypertrophy		4			1			6		
Hog cholera							243			
Immaturity	3,167									
Improper bleeding..	10			13			78	23		
Inflammation	9			4			20	2		
Icterus	6			10			22			
Induration		109						13		
Metritis	19			9			19			
Mucoid degeneration...	41									
Mammitis	2	13			1		1	50		
Mastitis				1						
Melanosis	4	2						2		
Necrosis	1	304			309			31,463		
Nephritis	11			1			4			
Parturition				2			3			
Parasites		30,674		2	103,935		1	30,770		
Pericarditis	45			3			7			
Peritonitis	38			8			63			
Pleuritis	7			8			52			
Proctitis							4			
Pneumomycosis					141					
Pneumonia	118			92			268			
Pyæmia or septicaemia.	182			66			392			
Sexual smell							153	331		
Skin disease							1	199		
Sarcoma	14						3			
Sapremia							1			
Sour		45	135,747			2,552	1		77,808	
Septic infection..	109						5			
Tuberculosis	2,488	20,334					2,240	435,333		
Tuberculosis pseudo...				5	27					
Tumours	11	81		2	1		7	11		
Uraemia	2						3			
Unmarked			233			427		126	53	
Various	25	358	120	14	104		23	384	695	357
Damaged by fire..			120						400	
Total	7,177	119,742	722,743	399	106,274	23,101	4,007	521,097	173,185	357 and 407 car-cases.
Found dead	118			226			1,321			

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The following summary shows the results of post mortem inspections of Cattle, Sheep and Swine from April 1, 1913 to March 31, 1914.

Cattle marked "Canada approved"	524,817
Carcases of cattle "condemned"	7,177
Percentage of cattle "condemned"	1.35
Portions of cattle "condemned"	119,742
Sheep marked "Canada approved"	498,885
Carcases of sheep "condemned"	399
Percentage of sheep "condemned" . . . . .	.08
Portions of sheep "condemned"	106,274
Swine marked "Canada approved"	1,795,053
Carcases of swine "condemned"	4,007
Percentage of swine "condemned" . . . . .	.22
Portions of swine "condemned"	521,097
Total number of carcases "passed"	2,818,755
Total number of carcases "condemned"	11,583
Percentage of carcases "condemned" . . . . .	.41
Total number of portions "condemned"	747,113

In addition to the animals slaughtered at inspected establishments, the following amounts of dressed and cured meats and lard, etc., were received during the fiscal year from the United States and Australasia:—

	Pounds.
Beef	7,282,345
Mutton	1,665,100
Pork	5,627,353
Lard	1,914,555
Miscellaneous	3,413,861

During the course of reinspection the following meats were condemned:—

	Cattle.	Sheep.	Swine.	Poultry.
	Lbs.	Lbs.	Lbs.	Lbs.
Sour	135,747	2,552	77,808	.....
Dirty	474,852	270	12,712	.....
Emulsed	4,211	1,334	41,854	.....
Decomposed	106,003	18,518	39,663	.....
Damaged by fire	120	.....	400	.....
Unmarked	233	427	53	.....
Various	1,577	.....	695	357
	722,743	23,101	173,185	357

Total amount condemned on reinspection, 919,386 pounds.

CAR AND YARD INSPECTION.

Railways are obliged, under the regulations, to maintain stock yards and stock cars in a clean sanitary condition, and to disinfect them at frequent intervals. A sufficient number of inspectors is engaged in seeing that this work is efficiently and thoroughly done as the importance of this work can hardly be overestimated. Infected cars and yards are very dangerous means of spreading disease and constant watchfulness is necessary to avoid trouble from this source. I am glad to report that this part of our service is carried out satisfactorily by our officers and that the railways appear to realize its importance by their willingness to do whatever is required.

I have the honour to be, sir,

Your obedient servant,

F. TORRANCE,
Veterinary Director General.

Hon. MURRAY BORDWELL,
Minister of Agriculture.

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APPENDIX No. 1.

(G. Hilton, V.S., Chief Veterinary Inspector.)

OTTAWA, March 31, 1914.

SIR,—In submitting my report for year ending March 31, 1914, I would say that my duties during this period have been of an executive nature at headquarters.

I, however, attended the seventeenth annual meeting of the United States Live Stock Sanitary Association, in Chicago, during the first week in December, and read a paper on the Control of Hog Cholera by slaughter methods.

I have the honour to be, sir,

Your obedient servant,

GEORGE HILTON,
Chief Veterinary Inspector.

APPENDIX No. 2.

(R. Barnes, V.S., Chief Meat Inspection Division.)

OTTAWA, March 31, 1914.

SIR,—I have the honour to submit my annual report for the year ending March 31, 1914.

The work of this division has steadily increased during the year, not only in volume but in efficiency.

Instructions have been given to our inspectors regarding the handling and the methods of preparation of various meats and meat food products, and the technical inspection of such articles, with beneficial results.

Improvement has been marked in the sanitary conditions of establishments under inspection. Changes and alterations have been made, the materials used being of a non-absorbent nature, which will be a big factor in keeping such plants in a clean and satisfactory condition.

During the year there was completed and put into operation in Toronto one of the largest packing plants in Canada. This factory is modern in structure and equipment, and is a credit to its owners and to the Dominion.

On April 22, the annual examination was held throughout Canada. Forty-six candidates presented themselves, of whom thirty-three were successful in passing.

During the year a number of additions were made to the staff, both in veterinary and lay inspectors. This was made necessary by the bringing under inspection of the large plant of the P. Burns Company at Edmonton, and the smaller establishment of the Dominion Abattoir Co., Ltd., London, Ont., together with a gradual strengthening of the entire staff throughout the Dominion; yet, with these additions, the service is at the present time no more than able to meet the demands and maintain an efficient inspection.

To do this it is still necessary during the heavy killings in the fall for your inspectors to be called upon to work overtime. This they have done with little complaint, but to this cause may be ascribed in many instances the somewhat unusual amount of sickness which occurs amongst them during the winter months.

In the early fall, owing to the removal of the duty on imported meats by the United States, the larger establishments at once began exporting meats and meat food products, more particularly beef, on a large scale. This immediately increased the price paid to the producer for this class of meat food, which was no doubt appreciated and taken full advantage of, yet it has certainly decreased the supply in Canada of this already limited article of food. To this cause principally may be attributed the increase in the number of animals slaughtered, which shows an excess over the previous fiscal year, as follows:—

	Total Killings.	Increase over previous year.
Cattle.....	531,994	81,614
Sheep.....	49,284	43,677
Swine.....	1,799,060	191,319

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The increases or decreases in the killings in each province are shown to be as follows:—

	Cattle.	Sheep.	Swine.
Ontario.....	+ 29,212	+ 3,285	— 98,410
Quebec.....	+ 43,223	— 4,101	— 46,483
Manitoba.....	— 13,321	— 7,000	+ 85,626
Alberta.....	+ 1,379	+ 15,109	+ 158,337
Saskatchewan.....	+ 372	+ 3,014	+ 32,556
British Columbia.....	+ 19,727	+ 40,967	+ 61,025
Prince Edward Island.....	+ 1,012	— 7,637	— 1,332

+ Increase. — Decrease.

The percentage of increases in killings is as follows:—

Cattle slaughtering increased 18 per cent over 1913.
 Sheep " " 9 per cent over 1913.
 Swine " " 12 per cent over 1913.

The calves killed represent 21 per cent of total cattle killed, and have about the same ratio of increase as cattle, 18 per cent over 1913.

Hogs—Eastern Canada, decrease 10 per cent.
 " Western Canada, increase 146 per cent.

The percentage of slaughter for each province to the total kill for all Canada is:—

	Cattle.	Sheep.	Swine.
	Per cent.	Per cent.	Per cent.
Ontario.....	38	30	49
Quebec.....	38	30	18
Manitoba.....	10	10	12
Alberta.....	8	13	13
Saskatchewan.....	1	2	2
British Columbia.....	5	10	4
Prince Edward Island.....	.....	4	1

From the above you will notice the large increase in the slaughter of hogs in Western Canada over the preceding year. In 1912 the percentage of slaughter to the total kill for all Canada was 7 per cent; in 1913, 14 per cent, and in 1914, 31 per cent.

CATTLE CARCASSES CONDEMNED.

The greater part of the increase of carcasses condemned is due to condemnations of calves for immaturity. It is to be regretted that owners and feeders persist in sending this class of animals to market in an immature and unfinished condition rather than keep them for a few weeks or months, during which time they may be grown into a palatable and wholesome food, and thereby relieve the shortage of meat foods.

Increases are also shown in the condemnations for tuberculosis, bruises, emaciation, and cysticercus bovis. Of the first-named disease it must be expected that the condemnations will increase until some definite measures are adopted for its control.

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The success of any legislation in this direction will, to a large extent, be dependent upon the co-operation of the owners of affected animals and the demand from the general public that they be protected from this source of infection. While the latter are becoming alive to the danger, and are voicing their requests through Health Boards, the former have been, up to the present, by no means aggressive, and are scarcely sympathetic in the movement, being undoubtedly influenced by the financial side of the question rather than by its effect upon human health.

The number of carcasses and portions annually destroyed on account of bruises represents an unwarranted condition which exists in connection with the handling and transportation of meat food animals. With the exercise of reasonable care, many of the bruises could be prevented and thousands of pounds of meat saved for human food.

Emaciation is found almost entirely among the poorer, or what is known as "canner", cattle. Owing to the extraordinary demand for this class of meat during the fall of 1913 this naturally increased the number condemned.

Cysticercus (tape worm cysts) is found in cattle and hogs from Western Canada, but is rarely seen in animals bred and raised in the East. A more complete method of examination for these cysts was inaugurated during the year which has, perhaps, been a factor in the detection of an increased number of animals affected, with a corresponding increase in the condemnations.

SWINE.

An increase in the number of carcasses of swine condemned during the year may be attributed to the spread of tuberculosis and hog cholera.

Taking into consideration the increased slaughter of these animals, the number of portions condemned is about normal, except in the case of those showing bruises, where it is largely in excess of previous years. This is no doubt due to rough handling during transit.

The swine "found dead" are greatly in excess of last year, and can safely be attributed to overloading of cars.

The increased number of requests for information regarding the operation of the Act and Regulations is encouraging, and indicates that a lively interest is being taken in the safeguarding of the wholesomeness of our meat foods.

A number of applications for inspection have been received which could not be counted owing to the fact that the meat was intended for local consumption, and therefore did not come within the jurisdiction of the Act.

A modern municipal abattoir is under construction in Toronto which, when completed, will be a credit to that city. This will be the first public abattoir owned and operated by a municipality in the Dominion of Canada, and is a splendid tribute to the progressive and enterprising spirit of the citizens. This establishment will supply a long-felt want and, should it receive the loyal support which it deserves, coupled with efficient and careful management, its success is assured.

Prices for all classes of meat-food animals have been good, and should have returned to the feeder and producer a good profit on the capital invested and ample remuneration for the labour involved.

FRUIT VEGETABLES AND MILK.

The work in connection with the supervision of establishments engaged in the manufacture of this class of foods has been carried on with very little friction. The plants are well kept, and manufacturers have endeavoured to observe the requirements of the regulations, with the result that unclean and unsatisfactory premises will soon be a thing of the past.

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Considerable progress has been made in the proper marking and labelling of these products. Owing to the absence for so many years of standards governing the manufacture, many packers have adopted descriptions of the contents of packages which could not be said to be true and correct.

During the year the Department of Inland Revenue added to the standards already in force a new section dealing with the labelling of jam mixtures. This new section defines more clearly the necessary marking of such mixtures. This is amply justified, as the old standards permitted manufacturers to evade the spirit of the standards inasmuch as the label did not convey to the purchaser the proportionate ingredients which made up the finished product. Owing to the large number of labels on hand which were affected by this new section, we have not made such progress as we would wish, yet by continuing the present effort it is hoped to bring all into conformity during the coming year.

We have insisted that the presence of glucose be shown on the labels, as required by the standards. This requirement is being fairly well met.

While I am not at all anxious to take legal action, it may be necessary in some isolated cases to do so where the packer continues his indifference to our requirements.

A decided improvement is noticed in plants engaged in evaporating apples, also in their products, yet much remains to be done, especially in connection with the moisture content of the apples, which is fixed by law at 27 per cent, and from present information is, in my opinion, too high. Samples of apples, stock, and waste have been taken and will be tested for water-content and examined as to quality. With your permission, samples will again be taken next year and examined in the same manner. The information thus compiled will be the first of its kind obtained in Canada, and if the results of the two years' tests are such as we anticipate, it might not be out of place for me to suggest that a bulletin be issued dealing with this important subject in the hope that the information thus secured may be taken advantage of and result in an improvement in the methods of preparing and handling this class of food.

The work of the inspectors whose duty it is to look after this particular line of food has been generally satisfactory.

CONDENSED MILK.

Nothing of particular importance has developed in connection with the inspection of this food. The strict sanitary methods adopted in regard to its manufacture ensure to the purchaser a healthful, nourishing food at a minimum cost.

I desire to thank not only the members of the office staff but also the veterinary and lay inspectors on duty at the different establishments throughout the Dominion for their hearty co-operation in carrying out the requirements of the work. The chief travelling inspectors have been especially attentive to their duties and have, at considerable personal discomfort, readily undertaken the many difficult and sometimes annoying tasks assigned to them.

I have the honour to be, sir,

Your obedient servant,

ROBT. BARNES,
Chief, Meat and Canned Foods Division.

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APPENDIX No. 3.

(A. E. Moore, D.V.S., Chief Travelling Inspector.)

OTTAWA, March 31, 1914.

SIR,—I have the honour to submit herewith my annual report for the year ending March 31, 1914.

During the year I have interviewed many of the field inspectors at their headquarters, for the purpose of consulting them and enlightening them on various subjects pertaining to their work.

I have also visited at different times nearly all the quarantine stations and inspection ports in Eastern Canada. I have especially endeavoured to impress on the officers in charge of the quarantine stations the importance of keeping the Government property scrupulously clean and thoroughly disinfected at all times, and I am pleased to say that there is a marked improvement in this respect.

In January, according to your instructions, I visited Saskatchewan to consult with Inspector Tamblyn with reference to the work in that province, and especially with regard to the hog cholera situation.

I personally met nearly all the inspectors of the province, and carefully instructed them in the method of handling and diagnosing hog cholera, and am convinced that they are now all as capable of dealing with the disease as the other inspectors of the Dominion. I advised some changes in placing the inspectors in the field, so as to enable them to accomplish their work to better advantage, and without unnecessary loss of time.

GLANDERS.

I am pleased to say that personally I have not seen any glanders this year. I have tested with mallein twenty-two suspects, however, but with negative results, suspicion being due to various disorders somewhat resembling glanders.

TUBERCULOSIS.

Assisted by Inspectors Marriott and Hall, I have tested five hundred and ninety-three (593) cattle on seven different premises, sixty-seven (67) reacted, and seven were considered suspicious. These cattle are under the direct supervision of this branch.

TESTING FOR EXPORT TO THE UNITED STATES AND OTHER COUNTRIES.

I have tested 122 cattle for export to the United States on eleven different premises and obtained only one reaction. I have also tested thirteen cattle for export to New Zealand, two of which reacted, and sixty-seven cattle for Western Canada, and obtained two reactions.

During the year I have applied the intradermal test to about two hundred cattle, with results which correspond fairly well with the subcutaneous test. I believe that this method of testing will prove of great assistance, especially in doubtful subcutaneous tests, and in animals advanced in pregnancy, or presenting other conditions which might cause a fluctuating temperature. The great advantage of this method is that it may be applied under any conditions, and to very young calves. The results are more difficult to arrive at than the subcutaneous method, and requires considerable experience before an inspector becomes an expert.

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HOG CHOLERA.

There have been several outbreaks of hog cholera in eastern Canada this year which might have become serious had it not been for the prompt attention of the inspector. Fortunately, we have been able in most cases to prevent the inspection from spreading.

As in former years, the origin of many of the outbreaks of hog cholera has been the feeding of hotel garbage. These garbage-fed hogs are always in large lots, and consequently the losses are heavy. The practice of feeding this material should be prohibited.

As I have many times previously reported, not only do these outbreaks create new hog cholera centres all over the Dominion, but the hogs are kept in indescribable filth, and fed on material containing every conceivable thing in the way of animal and vegetable refuse, and in all stages of decomposition.

The people who collect and feed this garbage are usually foreigners, Italians, Swedes, etc., or irresponsible persons who have no regard whatever for cleanliness or sanitary surroundings.

I have instructed all the Inspectors who have their headquarters in cities to make periodic inspections of all the garbage-fed hogs in their surrounding districts, to warn the owners as to the danger of feeding this material, and to inform them that the department may withhold compensation should their hogs develop hog cholera.

This inspection has been done at spare times, and a great many places have been visited.

The most serious outbreak of hog cholera which happened this year originated in hogs belonging to a large breeder in the Province of Quebec. The disease developed soon after his return from the exhibitions.

As this breeder made numerous sales, and as his breeding hogs were in contact with many others, a large number of pure-bred hogs were consequently involved. The disease spread to twenty-six farms, and it was necessary to destroy all the hogs on these farms. Before the disease was finally eradicated, we were obliged to quarantine a large number of others, as they were indirect contacts. Fortunately, my personal knowledge of that part of the country enabled us to check the spread of the disease even far sooner than I expected.

I have also investigated several reports of suspected hog cholera in different parts of the country but found conditions usually due to improper feeding and unhealthy surroundings.

MANGE IN HORSES.

Several outbreaks of mange in horses were dealt with in Ottawa, and in the Counties of Carleton and Russell.

INSPECTION OF IMPORT HORSES.

During the year I have tested five horses imported from the United States, and which were entered on two different dates.

I am pleased to state that I have not seen a case of rabies, sheep scab, or anthrax during the year.

I have investigated several reported cases of the above diseases, but found other conditions in every case.

I have the honour to be, sir,

Your obedient servant,

A. E. MOORE,

Chief Travelling Inspector.

APPENDIX No. 4.

(C. D. McGilvray, M.D.V., Inspector in charge, Manitoba.)

WINNIPEG, Man., March 31, 1914.

SIR,—I have the honour to submit herewith report in connection with the Health of Animals in the province of Manitoba for the year ending March 31, 1914. The work of the branch here, during this period, has consisted in the carrying out of the various regulations and requirements of the Animal Contagious Diseases Act relating to animal quarantine and the control of diseases, as well also as that of the Meat and Canned Foods Act and the various regulations relating thereto.

DISEASES OF ANIMALS CONTROL.

The services of the officers detailed to this branch of the work have consisted chiefly in dealing with the control and eradication of such diseases affecting animals encountered here, as are scheduled under the Animal Contagious Diseases Act. The diseases dealt with have included glanders, hog cholera, mange of horses, mange of cattle, sheep scab, suspected dourine, and tuberculosis. Investigations have also been made of such other diseases and conditions affecting animals as appeared of sufficient importance and to be deserving of consideration and attention.

GLANDERS

The control and eradication of glanders in the province of Manitoba is, I am pleased to report, making satisfactory progress. The decrease in the number of outbreaks and animals found to be affected is still being maintained, indicating that the ultimate eradication of this disease is possible under the policy and measures by means of which glanders is dealt with in Canada.

Glanders Statistics for Manitoba.

The following summary shows the number of horses tested with mallein and destroyed for glanders during the year extending from April 1, 1913, to March 31, 1914.—

Horses submitted to the mallein test—	
First test.. . . .	212
Second test.. . . .	12
Horses found to react and destroyed for glanders—	
To a first test.. . . .	18
Of this number six were clinical cases.	
Total compensation allowed, \$1,780, being an average of \$98.89 per animal.	
Import horses tested at destination—	
First test.. . . .	35
Second test.. . . .	1

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Destroyed for glanders without compensation—

First test..	1
Second test..	1

These two horses destroyed for glanders had been smuggled into Canada from the United States, contrary to the regulations.

Total number of horses submitted to a first test..	247
“ “ “ second test..	13
“ “ destroyed for glanders..	20

HOG CHOLERA.

This disease of swine has again manifested itself during the past year in certain parts of the province of Manitoba. The number of outbreaks and animals which it was found necessary to destroy is slightly in excess of the previous year. Periodical inspection and supervision has been maintained by inspectors of the department throughout many districts in the province, and owners of hogs personally advised and instructed regarding the nature and symptoms of the disease, and furnished with the departmental bulletin on Hog Cholera. This educational work appears to be productive of good results in that owners of hogs are becoming conversant with the serious nature of the disease and now report promptly all suspected cases and readily co-operate in any steps necessary to control and stamp out the disease where present, and thus prevent it from becoming established here.

Hog Cholera Statistics for Manitoba.

Number of premises visited..	226
“ swine inspected..	4,245
“ premises quarantined..	39
“ premises on which disease was found to exist..	20
“ diseased and contact animals destroyed.. . . .	402

Total amount of compensation allowed for animals destroyed.\$2,965.

In the case of all premises where the disease existed, the diseased and contact infected animals were killed in the presence of an inspector, and the carcasses disposed of under his supervision in a satisfactory manner, either by cremating or burying deeply. The premises were also thoroughly cleansed and disinfected under the personal guidance and supervision of an inspector, and were kept under observation and quarantine restrictions for a period of at least three months. No hogs were allowed to be again introduced or kept on the premises until the above quarantine period had elapsed.

MANGE OF HORSES.

This disease of horses has been found to exist to a slight extent during the past year. All affected and contact horses were placed under quarantine restrictions and treated at regular intervals under the supervision of an inspector, by means of the approved official mange preparation, until cured of the disease. Likewise the harness and stable utensils, together with the premises occupied, were also thoroughly cleaned and disinfected under the supervision of an inspector, before releasing the animals from quarantine.

Total number of horses inspected for mange	222
Total number of horses quarantined and treated	44

MANGE OF CATTLE

This disease has not been found affecting cattle other than among those arriving at the stockyards in Winnipeg, coming for immediate slaughter from the mange-infected area in the province of Alberta. All cattle originating west of Winnipeg have been unloaded and inspected at the Winnipeg stockyards, and animals destined to other points have been allowed to proceed only after being inspected and accompanied by the inspector's health certificate. Cattle, unless apparently healthy and free from mange, were detained and not allowed to be removed from the yards except for immediate slaughter at an establishment under inspection. During the past year a considerable number of cattle have been shipped from Winnipeg to points east and west thereof, and also to the United States. These cattle were only permitted to be shipped after having been duly inspected and accompanied by the inspector's health certificate.

The number of cattle inspected at Winnipeg was as follows:—

Cattle destined to points east of Winnipeg..	4,470
Cattle destined to points west of Winnipeg..	7,120
Cattle destined to points in the United States..	17,003
Cattle for slaughter at Winnipeg..	77,983
<hr/>	
Total cattle inspected..	106,576

Of the above cattle inspected, ninety-five were found to be affected with mange, having come from the mange-infected area in the province of Alberta.

SHEEP SCAB.

This disease has recently been found to exist among several flocks of sheep in the Lake Manitoba district. All suspected flocks have been carefully examined, and all affected and contact sheep have been placed under quarantine restrictions, and are to be treated until cured by being dipped at least twice at proper intervals of ten to fifteen days apart, under the personal supervision of an inspector, in the official lime and sulphur dip approved by the department. The premises occupied by affected sheep will likewise be properly cleaned and disinfected with limewash and carbolic acid, to the satisfaction of an inspector.

Number of sheep inspected	1,165
Number of sheep quarantined for treatment	399

In accordance with the requirement of Ministerial Order No. 40, there has been inspected at the Winnipeg yards, 31,970 sheep imported from the United States for immediate slaughter here.

GID IN SHEEP.

This disease of sheep, popularly known under the various names such as "gid," "sturdy," "turnsick" and "staggers" was observed by Inspector Still affecting a number of sheep in a shipment imported to Elkhorn, Man., from the state of Montana. The affected animals were noticed at the time of their arrival at destination, and the owner was fully advised and instructed as to the nature of the condition affecting the sheep and the proper measures to be adopted to get rid of it and to prevent its recurrence.

DOURINE.

This disease of horses has not as yet been detected in Manitoba. A stallion in the district of Gilbert Plains was reported as suspicious, but on inspection was found to be free from any affection of the generative organs, or other symptoms suggestive of dourine.

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TUBERCULOSIS.

During the past year the officers of the branch here submitted to the tuberculin test, 95 cattle intended for export to the United States. Of this number, 6 reacted to the test and were therefore permanently earmarked and their export prohibited.

There was also submitted to the tuberculin test 78 cattle which are under the control and supervision of the department, 12 of which reacted and were permanently earmarked.

There has also been received from practising veterinarians located at different parts of the province, test charts recording the results of tests conducted by them on cattle with tuberculin furnished for that purpose by the department. Charts reporting the test of 489 cattle were thus received, of which 84 were reactors and were therefore officially earmarked in accordance with the regulations relating to tuberculosis.

The total number of cattle officially recorded as tested during the year in Manitoba was 662, of which number 102 reacted to the test, consisting chiefly of dairy cattle.

BLACK-LEG.

This disease is reported from time to time as causing losses among young cattle in certain districts in which it appears to be more or less indigenous. When the presence of the disease is established in any district, owners of cattle are advised as to its true nature, and to resort to protective inoculation or vaccination of the susceptible animals at proper intervals, together with their removal from known infected areas, and to properly dispose of the carcasses of any animals which have died from the disease, preferably by cremating them completely.

During the year, 318 doses of black-leg vaccine have been supplied to owners for the purpose of vaccinating their cattle.

INSPECTION OF LIVE STOCK CARS AND YARDS.

In accordance with the requirements of Ministerial Order No. 37, all stock cars destined to Winnipeg, upon being unloaded or arriving empty, unless bearing evidence of having been previously cleansed and disinfected, are cleaned and disinfected with limewash and carbolic acid before being allowed to proceed or returned to general traffic. This work is done under the personal supervision of an inspector stationed at the stockyards for that purpose, and who affixes to each car a card certifying as to the date upon which it had been dealt with. This inspection is maintained at the yards of the several railway companies here and, during the year, 6,670 cars were cleaned and disinfected.

The stockyards at Winnipeg, and at all other points throughout the province, have been inspected at certain intervals during the year by Inspector St. John, Inspector of Live Stock Cars and Yards. Each and all yards in the province have been cleaned and disinfected with limewash and carbolic acid at least once in the season, and at such other times as appeared necessary. In the case of any yards being reported or found to be in an unsatisfactory condition or poor state of repair, the attention of the railway authorities was drawn to same and they, in turn, remedied the conditions complained of. This work now having been in operation for a number of years has brought about a marked improvement in the condition of the stockyards throughout the province.

ANIMALS QUARANTINE STATIONS.

The animals quarantine stations and inspection ports in Manitoba are located at Emerson, Gretna, Bannerman, and Snowflake.

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EMERSON QUARANTINE STATION.

This station is located at Emerson on the international boundary line, at a point where the Canadian Northern and Canadian Pacific lines of railway and their American connections intersect. The officer in charge at this point is Inspector Bes-
coby. Besides the inspector in charge, a caretaker is also maintained at this point, whose services are made use of in assisting the inspector in charge and more especially in keeping the yards and stables in good repair and cleanly condition. The yards and stables are disinfected with lime wash and carbolic acid from time to time as required.

During the year there have been presented for entry and inspection the following animals:—

Horses.. . . .	5,629
Mules.. . . .	468
Cattle.. . . .	1,538
Sheep	13,084
Goats.. . . .	19
Swine.. . . .	128
Fees collected.. . . .	\$1,067 85

GRETNA QUARANTINE STATION.

This station is located at Gretna on the international boundary line, and is conveniently situated between the Canadian Pacific railway and the Midland branch of the Great Northern railway, each of which lines has a branch spur into the quaran-
tine yards. The officer in charge at this point is Inspector J. A. Stevenson. Besides the Inspector in charge there is also maintained a caretaker, whose services are made use of in keeping the stables and yards in a satisfactory state. During the year there have been presented for entry and inspection the following number of animals:—

Horses.. . . .	949
Mules.. . . .	192
Cattle.. . . .	219
Sheep.. . . .	20,741
Goats.. . . .	5
Swine.. . . .	Nil.
Fees collected.. . . .	\$693 93

BANNERMAN QUARANTINE STATION.

This station is located on the B.S. & H. B. branch of the Great Northern railway at Bannerman, which is distant about 3½ miles from the international boundary line. The officer in charge at this point is Inspector F. J. Braund.

During the year there have been presented for entry and inspection the following number of animals:—

Horses.. . . .	260
Mules.. . . .	3
Cattle.. . . .	88
Sheep.. . . .	1,895
Goats	5
Swine.. . . .	1
Fees collected.. . . .	\$125.51

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SNOWFLAKE INSPECTION PORT

Snowflake which is an inspection port, is located on the Snowflake branch of the Canadian Pacific railway, distant about 3 miles from the international boundary line. The officer in charge at this point is Inspector J. C. Bonnett.

During the year there have been presented for entry and inspection the following animals:—

Horses.. . . .	146
Mules.. . . .	Nil.
Cattle.. . . .	22
Fees collected.. . . .	\$36.75

There were also presented for entry and inspection at Sprague 2 horses and 3 cattle, fees amounting to \$1.75 being collected on two horses.

The following summary shows the total number of animals from the United States presented for entry and inspection at the several ports of entry in Manitoba:—

Horses and mules inspected.. . . .	7,649
“ “ submitted to a first mallein test.. . . .	1,542
“ “ submitted to a second mallein test.. . . .	25
“ “ which reacted and were refused entry.. . . .	6
Cattle inspected.. . . .	1,870
“ submitted to the tuberculin test.. . . .	43
Sheep inspected.... .	35,720
Goats inspected.. . . .	29
Sheep refused entry.. . . .	402
Swine inspected.. . . .	129
“ refused entry.. . . .	20
Fees collected.. . . .	\$1,925.79

EXAMINATION OF THOROUGHBRED STALLIONS.

During the year we have, on instructions received, made an examination for soundness and suitability of the following thoroughbred stallions, standing for service in the province:—

“John Corr”, No. 521, the property of Mr. E. Payne, Wawanesa.

“Lafe”, No. 488, the property of Mr. Wm. Barry, Shellmouth.

“Stage Pirate”, No. 457, the property of The Canadian National Bureau of Breeding, in charge of Mr. G. Greenwood, Treherne.

“Bion”, the property of the Canadian National Bureau of Breeding, in charge of Mr. D. P. Stratton, Melita.

“Vance Guard”, No. 166, the property of the Canadian National Bureau of Breeding, in charge of Mr. R. C. Cochrane, Oak River.

“Brown Tony”, No. 403, the property of the Canadian National Bureau of Breeding, in charge of Mr. G. Ferguson, Cartwright.

“Oraculum”, No. 137, the property of the Canadian National Bureau of Breeding, in charge of Mr. Glen Campbell, Gilbert Plains.

“Kid”, No. 315, the property of the Canadian National Bureau of Breeding, in charge of Mr. H. Flett, Binscarth.

“Crawford”, No. 355, the property of the Canadian National Bureau of Breeding, in charge of Mr. Thos. Morris, Rosewood.

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"Loricata", No. 284, the property of the Canadian National Bureau of Breeding, in charge of Baron de la Rue du Can, St. Rose-du-Lac.

"Columbus", No. 99, the property of the Canadian National Bureau of Breeding, in charge of Mr. E. P. Ash, Ashville.

MEAT INSPECTION.

The work in connection with this division has consisted in the carrying out of the various requirements of the Meat and Canned Foods Act and the regulations relating thereto.

In accordance therewith inspection is maintained at the following establishments at Winnipeg:—

The Swift Canadian Co. Ltd., designated as Establishment No. 18.

The Gordon, Ironside & Fares Co. Ltd., designated as Establishment No. 19.

The Gallagher, Holman & LaFrance Co., designated as Establishment No. 20.

The Western Packing Co. of Canada Ltd., designated as Establishment No. 21.

During the year a competent staff of thirteen veterinary inspectors and three lay inspectors has been assigned and stationed on duty at these establishments.

Besides the actual work of technical inspection which is made of animals before and at time of slaughter, a close supervision is also exercised by the inspectors over the further preparation of all meat and meat-food products. Due regard is also given to the sanitary conditions existing at these establishments, and no carelessness in this respect is permitted.

During the first week in June, 1913, there was held at Winnipeg a Public Health Exhibition, at which this branch was asked to make an exhibit. On receiving your authorization, an exhibit was made, consisting of fresh and prepared specimens, showing, among other conditions, tuberculosis in different stages of development and affecting the organs and carcasses of both cattle and swine, actinomyces, measles affecting beef and pork, hog cholera, etc. These were supplemented by illustrations and photographs. Two inspectors were placed in charge of the exhibit, and explained to the many interested visitors the specimens on view and also the nature of the work conducted by the department through the Meat Inspection Service. Suitable literature in the nature of pamphlets and bulletins were also distributed. The exhibit attracted considerable attention and received much favorable comment and was no doubt of great educational value to the public in showing the precautions taken by the department to prevent the possible transmission of disease to human beings through unwholesome and diseased meat and meat-food products, thus safeguarding the public health from this source as far as possible.

All of which is respectfully submitted.

I have the honour to be, sir,

Your obedient Servant,

C. D. McGILVRAY, Inspector.

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APPENDIX No. 5.

D. S. Tamblyn, D.V.S., Inspector in charge Saskatchewan.

REGINA, March 31, 1914.

SIR,—I have the honour to submit herewith my annual report for the fiscal year ending March 31, 1914, for the province of Saskatchewan.

The work performed by the officers of the Health of Animal Branch of the Department of Agriculture, is as follows:—

GLANDERS.

In connection with this disease I feel that you, as well as those interested in the eradication of glanders, will appreciate the marked decrease in the number of outbreaks, as also the number of animals destroyed affected with this malady in this province during the past fiscal year. The policy followed has been identically the same as that of previous years, namely, the destroying of all reactors and the testing of all direct contacts, which I may state is proving a very effective manner of eradication.

It is also very noticeable that the farmers in general feel their duty more keenly in reporting suspicious cases of this disease. In short, the present situation is most encouraging, and I think the future can be looked forward to with great confidence.

The total number of animals submitted to mallein throughout the province is as follows:—

Horses	5,003
Mules	170
Asses	1
Burros	1

Out of the above the following animals were tested at the different boundary points:—

	Horses.	Mules.	Asses.	Burros.
North Portal	1,300	98	1	1
Big Muddy	211	7		
Marienthal	129	2		
Willow Creek	137	4		
Wood Mountain	626	22		
Northgate	15			

Two hundred and thirty-five (235) of the total number of animals tested, reacted, and were dealt with as follows:—

North Portal, 36 rejected and returned to U. S. A.
 Big Muddy, 4 rejected and returned to U. S. A.
 Wood Mountain, 3 rejected and returned to U. S. A.
 Northgate, 1 rejected and returned to U. S. A.
 Marienthal, 2 rejected and returned to U. S. A.

One hundred and eighty-six (186) native horses and three (3) mules were destroyed. One hundred and sixty-five (165) horses first test, twenty (20) second test, one (1) third test; two (2) mules first test, and one (1) second test. Seventy-one (71) of the total number of animals destroyed exhibited clinical symptoms.

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Total value of horses and mules destroyed \$29,255.

Total compensation of horses and mules destroyed, \$19,070.

Four imported horses valued at \$500 were destroyed without compensation.

Compensation on one Canadian horse destroyed, valued at \$150, was forfeited for violation by owner of the regulations of the department.

HOG CHOLERA.

In connection with hog cholera I would say that there was a considerable increase in the number of outbreaks this year over those of last.

The infected districts were as follows: Estevan, Souris, Moosejaw, Gravelbourg, Morse, Broderick, Thunder Creek, Crane Lake, Hawarden, Kerrobert, LacVert, Saskatoon, Luseland, and South Qu'Appelle.

Total number of swine under control.. . . .	7,044
Total number of diseased and contact swine destroyed.. . . .	3,825
Valuation	\$32,622 13
Compensation	21,348 08

Compensation was withheld on 322 hogs destroyed, valued at \$3,516.60.

This action was deemed advisable owing to the owners of the animals deliberately violating section 8 of the regulations of this department relative to hog cholera.

The history of a number of outbreaks dealt with by our officers during the past year tends to prove conclusively that the infection was caused by the feeding of garbage collected from hotels. This, I may state, was very noticeable in infected areas in close proximity to towns.

In the vicinity of Saskatoon, for instance, a number of swine owners were warned against the feeding of hogs on uncooked garbage or kitchen refuse, or on any raw animal flesh or similar food likely to convey the infection of hog cholera or swine plague, and were handed a copy of the regulations as well as the bulletin issued by this department in connection with this malady. Their rejecting of our officer's advice along these lines resulted in a second outbreak on their premises, with the result that they forfeited their rights to compensation.

I am also under the impression that the spreading of this disease was greatly due to neighbours visiting infected premises, where they had gone to sympathize with the owners, not thinking of the danger they were running into of carrying the infection to their own animals.

All means of disseminating the disease have been explained to owners of swine.

My notice has also been drawn to the fact that often a number of hogs are shipped to abattoirs for immediate slaughter. Many of these animals upon arrival are found to be in an unfit condition for slaughter; therefore, they are culled out and sold to any one. In most instances, farmers purchase such animals and remove them to their farms. The point I wish to draw your attention to here is that the hogs so purchased are sometimes obtained from infected areas, so that there is a tendency to spread the infection through this channel.

Another channel of infection which I consider of great danger is through the importation of live stock other than swine; owners of stock often bring along in their cars hog troughs, which in many cases may have originated from infected areas.

Wheat, barley, hay, and litter accompanying such importations are also a source of danger. The origin of the Kerrobert and Luseland outbreaks I attribute to this source, as most of the settlers in that part of the province immigrated from the states of Minnesota and Iowa.

While we were unable in this province to show any marked success during the early part of the year, as was anticipated, yet at the present time the control of this

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disease appears assured. Training the farmers to report the existence of the malady on his premises has been one of our great setbacks. Many of the farmers originally resided in the United States, and were not acquainted with our regulations, being under the impression, therefore, that no action was taken by the Dominion Government, and were content to permit their animals to die, saving those only that might escape infection, or which recovered after a slight attack.

I personally dealt with a number of outbreaks of hog cholera and have investigated the general condition from time to time.

During the past year the work of this department's officers in connection with hog cholera has not been entirely confined to outbreaks. Their services have had an educational value, in explaining to the farmers the different sources of infection and preventive measures, and free distributon of the bulletin issued by the Department.

HORSE MANGE.

Horse mange showed a slight increase. However, the disease is well under control due to the prompt steps taken to eradicate same by our officers. The following will show the amount of work performed in connection with this disease:—

Nine hundred and forty-one (941) horses and one (1) mule on inspection proved healthy.

Two hundred and twenty-five (225) horses and two (2) mules were placed under quarantine, out of which one hundred and seventy-seven (177) animals were found affected.

Eighteen (18) horses quarantined from the previous year were redressed and released.

Apart from the foregoing, numerous reinspections were made by our officers for the purpose of supervising the redressing of diseased and contact animals, and to see that all contact matter had been properly cleansed and disinfected in accordance with the regulations of this department.

TUBERCULOSIS.

In connection with this malady I have, for convenience, classed the cattle tested as follows:—

Imports.—Fifty-two (52) cattle were submitted to first test. No reactors.

Exports.—One hundred and twenty-nine (129) cattle were submitted to first test, five of which reacted, while one gave a suspicious reaction. One hundred and twenty-three (123) were tested, with negative results.

Official.—Two hundred and fifty-three (253) were submitted to first test, seventy-four (74) of which reacted, thirty-seven (37) gave suspicious reactions, one hundred and forty-two (142) were tested with negative results; thirty-one (31) of the above cattle were retested, ten (10) of which reacted and six (6) gave suspicious reactions, while fifteen (15) gave no reaction.

General.—Under this heading is shown the cattle tested by private practitioners with tuberculin supplied from this office at the request of owners. One hundred and sixty-seven (167) submitted to first test, twenty-six (26) reacted, one (1) suspicious, one hundred and forty (140) gave no reaction.

I personally tested ninety-seven (97) head of Hereford cattle for export. While under the head of official testing, I submitted to first test one hundred and ninety-four (194) head of cattle, seventy-four (74) of which reacted. I also retested thirty-one (31), ten of which reacted. The last mentioned, I may state, were confined to those herds which were placed under the control of this department by the respective owners, for the purpose of eradicating this insidious disease from their herds.

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SHEEP SCAB.

This disease did not make its appearance in this province during the past year.

RABIES.

A suspected case of this disease was reported by Dr. Sharpe, of Rocanville, but upon the specimen taken from the suspected dog being forwarded to the pathologist, it was found impossible to confirm the suspicion.

BLACK QUARTER.

This malady I regret to state is causing a great deal of anxiety to the farmers in certain districts of this province, due to the marked increase in the number of outbreaks during the last year. The numerous requests at this office for black-leg vaccine and information relative to this disease have increased to an alarming extent.

I may state that all the information possible has been sent out together with a free distribution of this department's bulletin dealing with same. The dissemination of the disease is no doubt due to the farmers not taking the necessary precaution in disposing of carcasses of animals which succumb to the disease, and in not vaccinating their young stock.

However, I am pleased to state that the farmers in most parts of the province have now been instructed relative to the preventive measures to be taken in eradicating this malady. It is therefore anticipated that this disease will show a marked decrease during the coming year.

Total number of doses of black-leg vaccine sold during the	
past year	7,407
Instruments	127
Needles	68
Value	\$442.35

INSPECTION OF STOCK YARDS AND STOCK CARS.

This branch of the work has been increased to a great extent, especially in view of the fact that hog cholera showed a tendency to advance. Under the circumstances, it necessitated, therefore, a careful vigilance over all stock cars, especially those originating from affected areas and which were used in connection with the transportation of swine. I am pleased to state, however, that the officials of all railways in this province appear to recognize the danger of disseminating this malady through this channel. When approached they are only too anxious to assist our officers in their duty, both in the disinfection of stock cars as well as stock yards, which is of so much importance.

Total number of stock cars cleansed and disinfected at Moosejaw during the fiscal year ending March 31, 1914, 1,892.

The stock yards over all lines of railways in this province are in an excellent condition.

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NORTH PORTAL QUARANTINE STATION.

The following figures show the number of animals presented for entry and inspection at the port of North Portal during the past fiscal year:—

Horses.. . . .	8,599
Mules	554
Cattle.. . . .	4,930
Sheep	196
Goats	9
Swine	18
Asses	11
Fees.. . . .	\$1,657.62
Horses tested.. . . .	1,299
“ retested	196
“ reactors—	
First test.. . . .	30
Second test.. . . .	6
“ B. A. I.. . . .	7001
Mules tested	98
“ retested	2
“ B. A. I.. . . .	452
Asses tested, 1 and 1 burro.	
“ B. A. I., 1.	
1 Shetland pony.	
2 horses and 1 foal temporarily rejected for mange.	
Cattle tested, 49.	

MARIENTHAL INSPECTION PORT.

The following figures show the number of animals presented for entry and inspection at the port of Marienthal during the past fiscal year:—

Horses	276
Mules	7
Cattle	47
Fees	\$100.75
Horses tested—	
First test.. . . .	129
Second test.. . . .	24
Mules tested.. . . .	2
Horses (B.A.I.).. . . .	104
“ Reactors	2
Cattle tested.. . . .	0

WOOD MOUNTAIN QUARANTINE STATION.

The following figures show the number of animals presented for entry and inspection at the port of Wood Mountain during the past fiscal year:—

Horses.. . . .	1,420
Mules.. . . .	28
Cattle	51
Sheep.. . . .	8,803
Fees	\$784.45

Horses tested—	
First test	626
Second test	10
Reactors	3
B. A. I.	439
Cattle—	
Tested	3
B. A. I.	1
Mules tested	22

NORTHGATE QUARANTINE STATION

The following figures show the number of animals presented for entry and inspection at the port of Northgate during the past fiscal year:—

Horses	94
Mules	4
Cattle	15
Fees	\$2.50
Horses tested—	
First test	15
Reactors	1
B. A. I.	79
Mules tested	2
“ B. A. I.	2

WILLOW CREEK QUARANTINE STATION.

The following figures show the number of animals presented for entry at the port of Willow Creek during the past fiscal year:—

Horses	211
Mules	4
Cattle	nil.
Sheep	3,462
Fees	\$135.44
Horses tested (first test)	137
“ B.A.I.	66
Mules tested	4

BIG MUDDY QUARANTINE STATION. -

The following figures show the number of animals presented for entry and inspection at the port of Big Muddy during the past fiscal year:—

Horses	1,063
Mules	27
Cattle	40
Sheep	Nil.
Fees	\$446.75
Horses tested—	
First test	211
Second test	13
Reactors	4
B.A.I.	186
Mules tested—	
First test	7
B.A.I.	6

The following is a summary showing the total number of animals presented for entry and inspection at the various quarantine and inspection ports in the province of Saskatchewan:—

Horses inspected..	11,665
Mules "	624
Cattle..	5,083
Sheep..	12,461
Swine..	18
Asses..	11
Goats..	9
Total amount of fees collected..	\$3,127.51

The following officers resigned: Inspectors C. Head and McIntosh, while H. Decock, of Wood Mountain, was appointed range rider, succeeding R. Decock. Inspector McLeish was transferred from this department to the Meat Inspection Service at Calgary. Inspector C. Brind was transferred from the field service in Saskatchewan to the Meat Inspection Division at Winnipeg. Inspectors MacConachie and Shonyo were employed in this province for a short period during the past fiscal year in connection with hog cholera work. Their services being no longer required they returned to their permanent headquarters, Vancouver and Winnipeg, respectively.

Miss W. Creswell, the stenographer at the Regina office resigned and was succeeded by Miss L. Cook.

In connection with boundary work in this province, I beg to state that there was very little change in the personnel of the different ports.

Inspector A. Hobbs was transferred from the Meat Inspection Division at Edmonton to the Health of Animals Branch, and was placed in charge of the Northgate quarantine station, while H. L. Cass, V.S., was temporarily engaged and given charge of the quarantine station at the port of Big Muddy, this officer holding the dual position of veterinary officer and sub-collector of customs, vice Inspector H. S. Manhard, resigned.

The port of Northgate on the line of the Grand Trunk Pacific was officially declared a Quarantine Station on March 15 last. This port will no doubt be of importance during the coming year, as I understand that the Grand Trunk Railway Company was not in a position to handle stock over their line during the past spring season, owing to certain difficulties with other companies relative to divisional point and rates.

There have been special stables and a corral built at the above port, so that the facilities are ample to cope with any shipment that may be presented.

The inspection port of Marienthal was officially declared closed on November 1, 1914. The officer in charge, Inspector E. A. Meakings, being transferred to field work of this branch of the service, with headquarters at Saskatoon.

During the year I visited the ports of Northgate, North Portal, and Big Muddy, with a view of inspecting same and discussing matters in general with the officers relative to stock importation, and other important points

Under the above heading, I may state that the officers of this department in this province examined twenty stallions for soundness during the past fiscal year.

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DOURINE.

In connection with the above malady, I may state that the officers in this province have been called upon to quarantine a number of suspected and contact cases, and have worked in conjunction with Dr. J. C. Hargrave and his officers, with a view of eradicating same. Samples of blood were procured from the animals placed under quarantine and forwarded to the pathologist in charge at Lethbridge, Dr. A. Watson, for the serological test.

I have the honour to be, sir,

Your obedient servant,

D. S. TAMBLYN,
Inspector.

APPENDIX No. 6.

(J. C. Hargrave, D.V.S., Inspector in charge, Alberta.)

MEDICINE HAT, March 31, 1914.

SIR,—I have the honour to submit herewith my report for the year ending March 31, 1914, in connection with the Health of Animals Branch for the province of Alberta and such portions of British Columbia and Saskatchewan within which a part of the work being under the supervision of this office, such being the carrying out of requirements of the Animal Contagious Diseases Act and the regulations made thereunder, in addition to which various investigations of other diseases not mentioned in the Act.

Needless to say, at no time has the service of your inspectors been other than fully occupied in this work, the diseases demanding the greater amount of their time being dourine, hog cholera, and mange.

DOURINE.

I regret to have to advise you that a very extensive outbreak of this disease was detected in the southwestern portion of Alberta, which has necessitated the placing under quarantine restrictions of several large herds of horses, the securing of blood for laboratory testing from a very large number and the tracing of contacts disposed of from these various ranches and shipped to points not only in Alberta but Saskatchewan. This has entailed a great deal of work, but is progressing as rapidly as can be expected. The excellent work performed at the laboratory under the direction of Dr. Watson has permitted of this work progressing more rapidly than has been possible in the past, and permits of the different herds being released in a much shorter time than heretofore.

Attention was directed in my last annual report to the possibility of the disease being eradicated at an early date in the two provinces, Alberta and Saskatchewan. The outbreak above referred to as extending in a portion of the province of Alberta has evidently been a recurrence of the one dealt with in the vicinity of Magrath some three years ago, and, owing to the extensive leases in the neighbourhood whereon horses are very rarely, if ever, held under close observation, the disease evidently spread to a considerable extent before being detected, with the result that the number of infected animals found, in comparison with the figures for the past three years, is very large. Immediately however, that the existence of this outbreak was first brought to the attention of your inspectors, arrangements were made to proceed with the work of collecting laboratory material, and, although the climatic conditions were not very favourable, as the work had to be done during the winter months, yet over two thousand (2,000) head being tested, which would not have been possible had not every assistance been rendered by the owners and officials of the various ranches dealt with.

Statistics for Alberta.

Number of animals quarantined.. . . .	4,397
“ “ slaughtered (including 28 registered animals).. . . .	459
Value.. . . .	\$71,015.00
Compensation.. . . .	\$47,343.21

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Statistics for Saskatchewan.

Number of animals quarantined.. . . .	79
“ “ slaughtered.. . . .	12
Value.. . . .	\$2,100.00
Compensation.. . . .	\$1,399.98

GLANDERS.

Practically the same number of tests was made this year as was made a year ago with, however, a lesser number of reactors. Ninety-nine (99) head of horses were slaughtered for this disease, as compared with 151 a year ago. You will also remember that one of the inspectors of the department spent some two months in the more newly settled portion of the northern part of the province, namely, in the Peace River and Grand Prairie districts. During his entire trip no evidence of this disease was detected, although a number of tests was made at different points.

The major portion of those slaughtered was found in three outbreaks occurring in the Taber and High River districts, and in one outfit of construction horses.

In the Taber and High River districts this disease was dealt with in previous years, and the source of infection determined upon in the cases dealt with this year would indicate that all the contacts in the first instance had not been located. I think, however, that the work performed in these two districts this year will have the desired effect, as attention was directed to every possible contact; although there is always the danger that an occasional isolated outbreak from these old infected districts will occur from time to time.

Statistics for Alberta.

Native horses—

Number of horses tested once.. . . .	2,554
“ “ “ twice.. . . .	457
“ “ “ thrice.. . . .	30
“ “ slaughtered on inspection.. . . .	4
“ “ “ “ first test.. . . .	80
“ “ “ “ second test.. . . .	13
“ “ “ “ third test.. . . .	2
Value.. . . .	\$13,420.00
Compensation.. . . .	\$ 8,946.66
Number of horses presenting clinical symptoms.. . . .	37

Import horses—

Number of horses tested once.. . . .	129
“ “ “ twice.. . . .	1

In addition to the above, two (2) Indian horses imported from Montana were tested in Saskatchewan.

MANGE.

Aside from the further treating of horses remaining in quarantine at the commencement of the year, there were 11 premises and 928 horses quarantined, of which number 106 presented evidence of the disease.

I also beg to report that this disease among cattle was again found to exist to a lesser extent than a year ago, and the disease is now confined to a few isolated areas within the territory covered by the Special Mange Order which, however, owing to their

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situation, permitted us to curtail the boundaries of the area to some extent only, that is to say, the northern boundary in the province of Alberta was removed from the line between townships 42 and 43 to the line between townships 34 and 35. It is just possible that the eastern boundary of the area may be moved westward at the close of the present season.

Statistics for Alberta

Cattle mange—

Number of premises quarantined.. . . .	129
“ cattle quarantined.. . . .	53,303
“ cattle dipped once.. . . .	66,003
“ “ dipped twice.. . . .	64,598
“ “ hand treated.. . . .	905

STATISTICS FOR SASKATCHEWAN.

Number of premises quarantined.. . . .	23
“ cattle quarantined.. . . .	8,178
“ “ dipped once.. . . .	15,480
“ “ dipped twice.. . . .	15,090

TUBERCULOSIS.

There have been submitted to the tuberculin test by your inspectors, 395 head of cattle. All but two proved healthy. There were also tested by qualified practitioners, 329 head of cattle, with tuberculin supplied by your department. Of this number 7 reacted and were ear-marked in accordance with the regulations. In addition to the above, 48 import cattle were tested on reaching destination (Christie).

BLACKQUARTER.

This disease has apparently been on the increase as it has been reported from practically every portion of the province, and the number of applications for vaccine, and other inquiries, received at this office, as also by inspectors in different portions of the province, is sufficient evidence of this fact. At all times the inspectors endeavour to distribute information from a preventive point of view, and where vaccine has been requisitioned, bulletins in connection with the disease have always accompanied orders.

Total number of doses sold during the past year, 17,875.

RABIES.

It is very gratifying to be able to inform you that there has been no recurrence of this disease in the province.

HOG CHOLERA AND SWINE PLAGUE.

This disease of hogs has manifested itself to a greater extent than ever before in this province, and the investigation by inspectors indicates that the feeding of uncooked refuse and garbage from hotels and restaurants is responsible for these numerous outbreaks. Hog raisers, however, are commencing to realize the necessity of thoroughly cooking this garbage, and many have discontinued using it. Two cities within the province have taken steps to prevent its use by collecting all such refuse and disposing of it through their incinerators.

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The number of premises on which disease was found.. . . .	104
diseased and in contact hogs destroyed.. . .	2,393
Value.. . . .	\$20,993.75
Compensation.. . . .	\$13,995.84

In addition to the above, 1,611 hogs were slaughtered and found fit for consumption, while compensation was withheld in the case of 187 diseased hogs (included in 2,393).

The above figures do not include 35 hogs killed in British Columbia. Owners, Crows Nest Pass Lumber Co. Compensation, \$525.

BOUNDARY STATIONS.

Pinhorn.

Entries at this port:—

Horses.. . . .	..(1 foal)	48
Mules.. . . .		5
Cattle.. . . .	..(5 calves)	12
Sheep.. . . .	..(2,815 lambs)	7,699
Fees collected.. . . .		\$350.14

Coutts.

During the year an inspector's residence was built at this port, which has improved living conditions at that point very materially, in addition to which a well was sunk in connection with the quarantine accommodation at that point.

Entries at this port:—

Horses.. . . .	..(35 foals)	677
Mules.. . . .		27
Cattle.. . . .	..(18 calves)	5,265
Sheep.. . . .	..(1,493 lambs)	79,273
Swine.. . . .		6
Fees.. . . .		\$2,372.75
Number of reactors rejected.. . . .		4
" contacts "		8

Twin Lakes.

Entries at this port:—

Horses.. . . .	..(13 foals)	235
Mules.. . . .		4
Cattle.. . . .	..(1 calf)	25
Fees.. . . .		\$83
Number of reactors.. . . .		nil.

Gateway.

Entries at this port:—

Horses..(5 foals)	235
Mules.. . . .		21
Cattle..(4 calves)	7
Swine.. . . .		10
Fees.. . . .		\$99.77
Number of reactors.. . . .		nil.

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Kingsgate.

Entries at this port:—

Horses..	(77 foals)	1,667
Mules..		69
Cattle..		172
Sheep..		4,729
Fees..		\$297.18
Number of reactors rejected..		1
“ contacts “		1

I have the honour to be, sir,

Your obedient servant,

J. C. HARGRAVE,
Chief Inspector for Alberta.

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APPENDIX No. 7.

(S. F. Tolmie, V.S., Chief Inspector in charge British Columbia.)

VICTORIA, B.C., March 31, 1914.

SIR,—I have the honour to submit my annual report for the year ending March 31 1914.

I am pleased to say that as far as contagious diseases of animals are concerned, the situation in British Columbia has much improved during the year. This is particularly noticeable in the case of hog cholera, a disease that occurs more frequently than any other here. Last year there were 110 outbreaks, and \$11,405.19 was paid in compensation. This year only 86 outbreaks occurred, and but \$5,320.88 in compensation was paid. This has been largely due to the dissemination of information among hog owners through the Hog Cholera Bulletin issued by the department, and also to the careful house-to-house inspection carried on whenever inspectors have been available for the work.

Mange has not shown itself at all this year, and but few cases of glanders were encountered. This is in strong contrast to what was experienced in British Columbia in connection with this disease some years ago.

Rabies.—An outbreak of rabies was reported at Mission, but no confirmatory evidence was secured. During March, 1914, this disease was reported at Duncans, on Vancouver Island, and vigorous steps are being taken for its eradication.

Stock Car Inspection has greatly increased, and this part of the service is becoming more efficient from year to year.

Excellent work has been performed by your Inspectors on the boundary line. Prompt service has been rendered, and a number of diseased animals rejected.

Stock Yard Inspection has been well carried out and, on the whole, the yards in this province are in a very creditable condition.

A number of cattle have been tested by your inspectors for the Dominion Live Stock Branch in connection with their policy for the distribution of pure-bred sires.

Blackleg has appeared occasionally during the year. The farmers are now vaccinating freely. A large number of doses of blackleg vaccine and outfits have been distributed. In this connection the farmers of the Nicola valley and the Health of Animals branch are indebted to Mr. J. A. Guichon, of Quilchena, who kindly stocks and distributes this material without charge.

One case of Dourine was condemned and destroyed by Inspector Jermyn at Osoyoos, the mare in question being presented for entry in this province.

One report of Anthrax was received but on investigation it proved to be groundless.

Inspector Maconachie was ordered to Saskatchewan during the winter, and was engaged there from January 10 to February 18.

The following is a brief summary of work performed within the province and at boundary ports:

Glanders—

Native horses tested once	48
Native horses tested twice	3
Horses slaughtered	2
Horses showing clinical symptoms	2
Value	\$215.00
Compensation paid	\$143.33

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Hog Cholera—

Premises quarantined during year.. . . .	98
Premises in quarantine at end of year.. . . .	20
Hogs died.. . . .	241
Hogs slaughtered under inspection and passed.. . . .	576
Diseased hogs slaughtered.. . . .	814
Value of diseased hogs slaughtered.. . . .	\$7,956.50
Value of hogs slaughtered for post mortem purposes.. . . .	24.98
Compensation paid.. . . .	5,320.88

Compensation was withheld from two owners on account of non-compliance with the regulations.

Mange—

Number of premises quarantined during year.. . . .	23
Remaining in quarantine at end of year.. . . .	9

The above premises are those used in connection with the slaughter of cattle from the Mange areas of Alberta and Saskatchewan.

Rabies—

Quarantines imposed.. . . .	18
Premises still under quarantine.. . . .	14
Stock cars inspected.. . . .	3,769
Cattle inspected for export.. . . .	27

Boundary inspection—

Number of horses inspected.. . . .	3,024
Colts.. . . .	76
Mules.. . . .	80
Cattle.. . . .	762
Calves.. . . .	68
Sheep.. . . .	66,204
Swine.. . . .	73
Goats.. . . .	741
Asses.. . . .	8
Peccaries.. . . .	8
Elk.. . . .	7
Horses tested once.. . . .	1,180
Mules.. . . .	31
Asses.. . . .	4
Horses tested twice.. . . .	9
Horses reacting to test.. . . .	21
Mules	12
Contacts rejected.. . . .	62
Horses presented second time.. . . .	9
Cattle tested.. . . .	137
Rejected.. . . .	1
Total amount of fees collected.. . . .	\$3,341.04

Please find attached details of boundary inspection at each port in this province.

Valuable services have been rendered by Dr. Hadwen, the pathologist in charge of the research laboratory at Agassiz, in connection with the diagnosis of obscure diseases.

I have the honour to be, sir,

Your obedient servant,

S. F. TOLMIE,
Chief Inspector for British Columbia.

DETAILS OF BOUNDARY INSPECTION.

Name of Port.	Horses	Mules	Cattle	Sheep	Swine	Goats	Asses	Peccaries	Elk	Reactors.				In contacts Tested.				Native horses tested.	Poultry.	Exports.	Cars cleaned.	Feed.
										Retested.				In contacts Tested.								
										H.	M.	C.	H.	M.	H.	M.	C.						A.
Osoyoos	416	12	48	185	0	0	0	0	0	18	12	0	46	1	412	12	3	0	1	143	75 80	
White Rock	932	11	56	25,792	3	8	6	0	5	0	0	0	0	0	37	0	16	2	0	0	906 00	
Huntingdon	693	29	139	7,018	8	665	2	0	0	1	0	0	1	0	143	4	28	2	0	3,244	593 23	
Vancouver	204	12	20	28,224	0	58	0	8	2	0	0	0	0	0	29	0	0	0	0	0	804 32	
New Westminster	9	2	21	476	0	0	0	0	0	0	0	0	0	0	13	2	15	0	0	111	4 20	
Nelson	26	0	56	0	0	0	0	0	0	0	0	0	0	0	41	0	13	0	0	0	32 00	
Roseland	65	0	0	0	0	0	0	0	0	0	0	0	0	0	25	0	0	0	0	0	151 45	
Rykerts	25	0	0	0	0	0	0	0	0	1	0	0	0	0	163	7	49	0	1	0	1 00	
Grand Forks	167	7	315	400	61	2	0	0	0	0	0	0	0	0	74	0	8	0	0	0	347 27	
Midway	102	0	28	3,102	1	0	0	0	0	0	0	0	0	0	63	2	0	0	0	0	136 77	
Keretons	103	2	3	162	1	0	0	0	0	0	0	0	0	0	126	4	1	0	1	0	39 60	
Birdsville	126	4	38	0	0	0	0	0	0	0	0	0	0	0	38	0	1	0	0	0	101 45	
Myncester	40	0	1	0	0	0	0	0	0	0	0	0	0	0	16	0	0	0	0	0	17 25	
Victoria	125	1	28	845	0	8	0	0	0	0	0	0	0	0	0	0	0	0	0	19	126 70	
Kamloops	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Totals	3,024	80	762	66,204	73	741	8	8	7	21	12	1	61	1	1,180	31	137	4	1	13	3,517	3,341 04

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APPENDIX No. 8.

(W. W. Stork, V.S., Inspector in charge, Toronto).

TORONTO, March 31, 1914.

SIR,—I have the honour to forward annual report for the year ending March 31, 1914.

During the year my time has been occupied by departmental business at Toronto office of Health of Animals Branch of the Department of Agriculture, and in making investigations, from time to time, of reported outbreaks of contagious disease in various points.

During the year just passed the location of Toronto office has been changed, having been removed from Temperance street to West Toronto, in close proximity of Union stock yards, where a large proportion of the live stock trade has become centralized.

The change has proven beneficial in a large degree as, the officers being practically on the ground, no delay occurs in the inspection of stock and issuance of certificates for large export trade that developed in the past few months.

During the month of October, certificates covering the inspection of 37,790 cattle and 1,309 calves, about to be exported to the United States, were issued at Toronto office.

The Toronto office having now been established some five years, the work has assumed large proportions and, with the efficient staff directed from this office, the various stock yards, railway disinfection plants, and horse sale stables, are properly looked after.

As regards cleanliness and sanitary equipment, special attention is always given to the disinfection of stock cars, which fact can be attested to by cleanly appearance of empty stock cars now noticeable during transit.

Within the past year officers from Toronto office have been employed in twice supervising, at an interval of ten days, a very large number of pure-bred sheep intended for export to the United States.

They have also tested with tuberculin a number of pure-bred cattle, about to be consigned to the province of British Columbia, in addition to the animals exported to the United States.

Thoroughbred stallions entered for Government bonus have been examined for soundness by officers of this branch at numerous points in Ontario, the results of examination being promptly forwarded to your department.

Owing to resignation of resident inspector at port of Cobourg the business at this port was conducted from Toronto office; however, a new appointment of inspector for this port has now been made.

Regarding contagious diseases of stock in and around Toronto, I am pleased to state that, while many investigations of reported suspected trouble have been made, nothing of a very serious nature, excepting hog cholera, has occurred, the trouble being energetically dealt with.

RABIES.

From time to time isolated cases have come to our notice in districts which were formerly the seat of this trouble. In each case either destruction of contact dogs or enforced quarantine was rigidly enforced, and I am pleased to state the percentage of cases has been greatly reduced.

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HOG CHOLERA.

During the year, several serious cases of hog cholera developed in vicinity of Toronto, the trouble, we believe, emanating from hogs being fed on table refuse.

Every outbreak was energetically dealt with, special attention being given to rigid quarantine enforcement and disinfection of premises.

By visits and keeping in touch with owners of large piggeries at outskirts of Toronto, we are cognizant of existing conditions, and no time is lost in making investigation of any reported suspected trouble.

We have impressed on owners the necessity of keeping premises in sanitary condition, and are doing our best to discourage the use of refuse food.

SHEEP SCAB.

I am exceedingly pleased to state that in this district at least the trouble is apparently eradicated, and that not one authentic case has been dealt with during the past year.

ANTHRAX.

During the year several reports of this disease were investigated and, with the exception of one case, vicinity of Collingwood, Ont., all suspected cases terminated in the trouble being other than true anthrax.

GLANDERS.

In and around Toronto no case of glanders has been dealt with during the past year, the nearest cases being in the districts of Simcoe and Frontenac, where horses were destroyed as being infected with the disease.

I have endeavoured to be prompt with returns to department of all business transacted at Toronto office, and attached hereto is compiled statement of export and import animals, which I trust will be found accurate and correspond with statements rendered from time to time during the fiscal year.

I have the honour to be, sir,

Your obedient servant,

W. W. STORK.

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APPENDIX No. 9.

(W. H. Pethick, V.S., Inspector in charge, P.E.I.)

CHARLOTTETOWN, March 31, 1914.

SIR,—I have the honour to present herewith a brief report for the year ending March 31, 1914.

During the whole of this period my work has been largely in connection with the Meat Inspection Service in Prince Edward Island. As you have been kept fully informed by daily reports of every phase of the work here, I presume that further comment is unnecessary.

As your representative in the Health of Animals Branch, I am glad to be able to state that all classes of farm animals have been remarkably healthy during the past year. My services have, however, been utilized as heretofore in connection with reported outbreaks of contagious disease. Such matters were promptly and carefully investigated, and already fully reported upon.

The enforcement of the regulations concerning the inspection of foxes has added much to my work. All importations were carefully examined at the port of entry, and each animal re-examined at the expiration of twenty-one days from the date of landing. A few foxes affected with mange were promptly dealt with. Duplicates of all papers issued by me or in any way relating to the work referred to, have been forwarded to you from time to time.

PORT INSPECTION.

You will observe from my reports sent you monthly that the following animals were exported to Newfoundland from Summerside:—

Horses.. . . .	1
Cattle.. . . .	216
Sheep.. . . .	383
Swine.. . . .	1

These animals were carefully examined and found free from disease.

In compliance with your instructions, I have, as in the past, endeavoured to be of service to our stock owners by advising them, both in public meetings and elsewhere, as to the best means of keeping their flocks and herds healthy, my remarks being confined as much as possible to subjects having a close relation to the work of the Health of Animals Branch, including the Meat Inspection Service and its requirements.

During the year I have visited many sections of this province, and have thus been able to keep fully informed on all matters connected with both divisions of your branch of the service.

In conclusion, I wish to record my appreciation of the ready willingness with which the officers associated with me in the work have discharged their duties.

I have the honour to be, sir,

Your obedient servant,

W. H. PETHICK,

Inspector.

APPENDIX No. 10.

(M. V. Gallivan, V. S., Inspector, Lethbridge)

LETHBRIDGE, ALBERTA,

March 31, 1914.

SIR,—I have the honour to forward this my annual report for the year ending March 31, 1914.

INSPECTION OF STOCK.

The number of animals inspected for shipment during the past twelve months are as follows:—

Horses.. . . .	136
Cattle.. . . .	186
Mules.. . . .	33

Of the above sixty-one (61) horses, four (4) mules, and one hundred and forty-six (146) cattle were consigned to points outside the province of Alberta.

During month of May, I went to Nogales, Old Mexico, to inspect a number of cattle purchased by Messrs. Furman & Hill, which they intended to ship to Alberta.

These cattle were thoroughly inspected and dipped before a permit allowing owners to ship them to Canada was granted.

I have had the opportunity of inspecting these cattle several times since their arrival in this province, and on each occasion found a remarkable improvement in their condition.

GLANDERS.

I have tested five (5) native horses for glanders, all of which proved to be free from the disease. I have also examined a number of horses which were suspected to be affected, and found the symptoms which gave rise to suspicion to be due to caries teeth and other diseases of a non-contagious character.

CATTLE MANGE.

This disease still exists in district under my supervision, especially in the southern portion where the large ranches are located. The Knight Sugar company dipped their herd once last fall, but were unable to complete the second treatment owing to difficulties encountered with apparatus for heating vat, and repairs could not be completed in time to do dipping before the cold weather set in.

I have interviewed company's manager, who has promised to have necessary repairs made in the near future, and to thoroughly treat twice all cattle on company's premises.

Number of cattle dipped twice.. . . .	4,000
“ “ once.. . . .	6,017

MANGE IN HORSES.

Forty head of horses were found to be affected with mange on Knight Sugar Company's premises, which were promptly quarantined and successfully treated, and a recommendation for release of premises forwarded.

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The disease re-appeared this winter in a band of one hundred (100) head which ranged together in a south pasture field. The diseased horses, thirty (30) in number, and all contacts, were immediately quarantined and dipped in a cage vat containing lime and sulphur solution, to which had been added a quantity of paraffin oil.

This treatment was somewhat harsh, especially in cold weather, and was the means of killing several of animals dipped, but it seems to have had the desired effect, as the disease has disappeared from balance of bunch affected.

It was not my suggestion to add oil to lime and sulphur solution, but, on the contrary, I attempted to dissuade owners from using it at all.

HOG CHOLERA.

I have dealt with two outbreaks of this disease, one of which occurred on premises of Crowsnest Pass Lumber Company at Galloway, B.C., and the other on premises of J. B. Jett & Co., of Taber, Alberta. The origin of both these outbreaks was due to feeding uncooked garbage, and I found it necessary to slaughter one hundred and forty-six (146) hogs, all of them being sufficiently affected with disease to render carcasses unfit for human food. I have also investigated several reported outbreaks which occurred on three different farms and found losses which occurred to be due to errors in feeding or diseases which are non-contagious. When dealing with the three suspected outbreaks I found it necessary to slaughter 4 swine for post-mortem purposes.

Total number of hogs quarantined on 5 premises.. . . .	282
Total number of hogs slaughtered.. . . .	150
Total valuation of hogs slaughtered.. . . .	\$2,250
Total compensation paid.. . . .	\$1,500

TUBERCULIN TEST.

I have tested one animal for tuberculosis, and found animal to be free from the disease.

DOURINE.

An outbreak of this malady occurred amongst the large herds of horses owned by Knight Sugar Company and Mr. Ray Knight, who control extensive ranches in the Raymond district. The source from which these outbreaks originated cannot be positively stated, but suspicion strongly points to a syndicate percheron stallion, known as the Allen horse, which was imported from Oregon. This stallion was found to be diseased shortly after termination of first season's service in Canada, and died of disease a few weeks later at quarantine station.

Several mares bred to this stallion were also found to be diseased and were slaughtered. Other contact mares were kept in quarantine for two years, during which they were frequently inspected, but no clinical symptoms were discernible, and quarantine was terminated.

One of these contact mares was afterwards purchased by Mr. Ray Knight who bred her to several of his best stallions. This mare was the first to exhibit evidences of being affected, but the symptoms after a time gradually disappeared and animal was again put to work, although her gait remained abnormal.

Mr. Knight became alarmed when his pure-bred suffolk mares began to show peculiar symptoms and employed the services of two practising veterinarians who were unable to decide what the disease was. One suspected it was glanders and tested several mares with mallein, obtained no reaction, and concluded the disease to be a severe form of influenza. Two of these mares, which were kept in box stalls and properly cared for, died, also three which were running on range.

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The stallions which had served these mares appeared in perfect health and condition, and remained in such a state for some time after disease was diagnosed. The apparent healthy condition of stallions and opinions advanced by veterinarians prevented owners from suspecting that a contagious disease existed, and would not believe it when first informed that dourine was prevalent amongst their horses.

Finally, owners were convinced and arrangements made for procuring from each mare and stallion a quantity of blood, which was delivered to and tested by Dr. Watson, pathologist in charge of research laboratory at quarantine station.

The test proved beyond a doubt that all suspected animals and a large number of apparently healthy mares and stallions were diseased.

The percentage of diseased animals was so large that I expected to meet with some opposition when I would inform owners that a number of their best stallions and mares had reacted to test, and would be destroyed. The expected opposition was not met with, due to the fact that several mares which appeared in perfect health when blood was obtained had died and a number of others had broken down with disease. I also learned that some of pure-bred stallions were beginning to exhibit unmistakable signs of being affected, which was a prominent factor in convincing owners that the disease was dourine.

Mr. Ray Knight and officials of the Knight Sugar Company rendered every assistance, and furnished every convenience possible for Inspector Busselle and myself who were detailed to perform the duties in connection with obtaining blood from suspected animals, 90 per cent of which were unbroken range horses and had to be thrown by owners before blood could be obtained.

Every important symptom of the disease was noticed in animals affected, the most predominant of which was paralysis of throat. Animals so affected when breathing made a loud harsh noise which could be heard for some distance, and when made to move would invariably choke, fall, and be unable to rise for some time. Other mares which presented symptoms, such as plaques, swollen and depigmented vulva, incoordination, etc., always lived much longer than those affected with throat paralysis.

While obtaining blood from animals I made it a point to mark any mare or stallion which I thought presented the slightest suspicious symptoms, all of which gave a positive reaction. Mr. Ray Knight had marked several mares which he suspected to be affected, but presented no clinical symptoms. These mares, without an exception, also gave a positive reaction which proved accuracy of test to owners. Mr. R. Kinsey, chief stockman for Knight Sugar Company, says his conclusion is that the test is a reliable one or Dr. Watson is a good guesser. Kinsey also had marked several mares which he had good reason to believe were affected, all of which reacted and were destroyed.

The advantages of having such a test are many. Personally, I cannot imagine how it would be possible to even hope to eradicate a disease of this kind without its assistance. It eliminates the necessity of keeping a suspected herd in quarantine for long periods during which owners were not permitted to carry on breeding operations. In some cases it was found necessary to continue the quarantine for five years which occasioned considerable loss to breeders, the total of which cannot be easily calculated. At the expiration of these long periods, during which suspected animals were frequently examined, it was not possible to definitely state that the disease had been eradicated, therefore it was more or less a conjecture on the part of inspector when form 52 was forwarded. The amount of compensation paid for horses slaughtered in dealing with these outbreaks to some may seem great, but I don't think it would begin to compare with the sum it would be necessary to pay if the disease were dealt with on clinical symptoms only.

I believe it would continue, as in the past ten years, to manifest itself in new as well as old centers of infection year after year, and for an indefinite period. If the disease is to be eradicated the testing of all suspected and contact animals, and the slaughter of all reactors, I think is the only manner by which this desired result can be obtained.

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Number of premises quarantined for dourine.. . . .	10
Number of horses quarantined for dourine.. . . .	2,718
Number of grade stallions and mares slaughtered.. . . .	384
Number of registered stallions and mares slaughtered.. . . .	19
Total number slaughtered.. . . .	403
Total valuation of horses slaughtered.. . . .	\$60,310
Total compensation of horses slaughtered.. . . .	\$40,206.66

I have the honour to be, sir,

Your obedient servant,

M. V. GALLIVAN,
Inspector.

APPENDIX No. 11.

(J. A. Carter, D.V.S., Superintendent of Quarantine, Point Lévis, Quebec.)

QUEBEC, March 31, 1914.

SIR,—I have the honour to send my annual report on the operations of the Point Lévis Animals' Quarantine for the last twelve months.

There were imported through this station during the past year the following animals, viz:—

Cattle.. . . .	237
Sheep.. . . .	458
Swine.. . . .	29
Deer.. . . .	2
Goat.. . . .	1
Horses.. . . .	11

Making a total of.. . . . 738 animals.

As regards to breeds of animals and ownership, the following classification may be made:—

CATTLE.

Ayrshires—

R. R. Ness, Howick, Que.. . . .	61
Fertilizer Experimental Farm, Sydney, N.S.. . . .	4
J. D. Duncan, Montreal.. . . .	28
J. J. Hill, St. Paul, Minn., U.S.A.. . . .	12
Total.. . . .	105

Shorthorns—

J. B. Tiffin, Vancouver.. . . .	1
Macdonald College.. . . .	10
Mitchell Bros., Burlington, Ont.. . . .	5
John Graham, Carberry, Man.. . . .	4
Prof. G. E. Day, Guelph, Ont.. . . .	12
J. J. Hill, St. Paul, Minn., U.S.A.. . . .	27
Frank Cockshutt, Brantford, Ont.. . . .	6
Total.. . . .	65

Jerseys—

T. A. Cox, Brantford, Ont.. . . .	3
B. A. Bull, Brampton, Ont.. . . .	35
Total.. . . .	38

Guernseys—

B. A. Bull, Brampton, Ont.. . . .	5
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Galloways—

C. H. Hetchner, Chariton, Iowa.. . . .	13
--	----

Shetland—

W. H. Head, Vancouver, B.C.. . . .	5
------------------------------------	---

Wool-Haired—

R. R. Ness, Howick, Que.. . . .	3
---------------------------------	---

Polled Angus—

J. J. Hill, St. Paul, Minn.. . . .	3
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Total.. . . . 29

Grand total.. . . . 237

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SHEEP.

Shropshire—

T. A. Cox, Brantford, Ont...	27
Wm. Butler, Shifnel, Eng...	66
J. J. Hill, St. Paul, Minn...	22
Wm. Cooper and Nephews, Chicago, Ill...	2
Total...	117

Dorset—

John Milton, Portland, Oregon...	104
Wm. Cooper and Nephews, Chicago, Ill...	6
Total...	110

Hampshire—

T. A. Cox, Brantford, Ont...	8
John Milton, Portland, Oregon...	61
Wm. Cooper and Nephews, Chicago, Ill...	6
Total...	75

Cheviot—

Macdonald College...	30
Lieut.-Governor Brown, Regina, Sask...	10
Total...	40

South Down—

T. A. Cox, Brantford, Ont...	13
Wm. Butler, Shifnel, Eng...	1
Guy Drummond, Montreal...	24
Total...	38

Oxfords—

T. A. Cox, Brantford, Ont...	15
J. J. Hill, St. Paul, Minn...	22
Total...	37

Leicester—

R. R. Ness, Howick, Que...	10
Wm. Butler, Shifnel, Eng...	1
Jas. Douglas, Caledonia, Ont...	3
H. Smith, Camrose, Alta...	20
Total...	34

Cotswold—

Wm. Butler, Shifnel, Eng...	7
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SWINE.

Berkshire—

F. Cockshutt, Brantford, Ont...	2
T. A. Cox, Brantford, Ont...	25

Yorkshire—

Prof. G. E. Day, Guelph...	2
Total of swine...	29

DEER.

Light Grey—

Mrs. Ethelwyn McGibbon, Montreal...	2
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GOATS.

Major W. R. Digby, Vancouver, B.C...	1
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HORSES.

Grade pony gelding—J. Burstall, Quebec.. . . .	1
Welsh ponies—Wm. Butler, Shifnel, Eng.. . . .	3
Highland pony—Sir Chas. Fitzpatrick, Ottawa.. . . .	1
Shetland ponies—W. H. Head, Vancouver, B.C.. . . .	2
Hackney ponies—R. A. Snowball, Chatham, N.B.. . . .	2
French coach—Ecole d'Agriculture de Ste-Anne de la Pocatière .. .	1
Clydesdales—R. A. Snowball, Chatham, N.B.. . . .	1
Total	11

The following is a list of the importers showing the number and kind of animals which they imported:—

Lieut.-Governor Brown, Regina, Sask.. . . .	10 Cheviot sheep.
Bull, B. A., Brampton, Ont..	35 Jersey cattle.
	5 Guernsey cattle.
Butler, Wm., Shifnel, Eng..	1 Leicester sheep.
	1 South Down sheep.
	7 Cotswold sheep.
	66 Shropshire sheep.
	3 Welsh ponies.
Burstall, J. F., Quebec.. . . .	1 grade pony.
Cox, T. A., Brantford, Ont..	3 Jersey cattle.
	25 Berkshire swine.
	8 Hampshire sheep.
	13 South Down sheep.
	15 Oxford sheep.
	27 Shropshire sheep.
Cockshutt, Frank, Brantford.. . . .	2 Berkshire swine.
	6 shorthorn cattle.
Cooper, Wm. and Nephews, Chicago, Ill.. . . .	2 Shropshire sheep.
	6 Dorset sheep.
	6 Hampshire sheep.
Douglas, James, Caledonia, Ont.. . . .	3 Leicester sheep.
Duncan, J. D., Montreal.. . . .	28 Ayrshire cattle.
Day, Prof. G. E., Guelph, Ont..	12 Shorthorn cattle.
	2 Yorkshire swine.
Drummond, Guy, Montreal.. . . .	24 South Down sheep.
Digby, Major W. R., Vancouver.. . . .	1 goat.
Ecole d'Agriculture, Ste-Anne de la Pocatière..	1 French coach horse.
Fertilizer Experimental Farm, Sydney, N.S....	4 Ayrshire cattle.
Fitzpatrick, Sir Chas., Ottawa.. . . .	1 Highland pony.
Graham, John, Carberry, Man.. . . .	4 Shorthorn cattle.
Hill, J. J., St. Paul, Minn.. . . .	27 Shorthorn cattle.
	12 Ayrshire cattle.
	3 Polled Angus cattle.
	22 Oxford sheep.
	22 Shropshire sheep.
Hetchner, C. H., Chariton, Iowa.. . . .	13 Galloway cattle.
Head, W. H., Vancouver.. . . .	5 Shetland cattle.
	2 Shetland ponies.
Mitchell Bros., Burlington, Ont.. . . .	5 Shorthorn cattle.
Milton, John, Portland, Oregon.. . . .	61 Hampshire sheep.
	104 Dorset sheep.
McGibbon, Mrs. Ethelwyn, Montreal.. . . .	2 deer.
Macdonald College.. . . .	10 Shorthorn cattle.
	30 Cheviot sheep.
Ness, R. R., Howick, Que.. . . .	10 Leicester sheep.
	3 West Highland cattle.
	61 Ayrshire cattle.
Smith, Herbert, Camrose, Alberta.. . . .	20 Leicester sheep.
Snowball, R. A., Chatham, N.B.. . . .	2 Hackney ponies.
	1 Clydesdale horse.
Tiffin, J. B., Vancouver, B.C... . .	1 Shorthorn cattle.

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Of the 738 animals imported 460 were for Canada and 278 for the United States, as follows:

Cattle—	For Canada.	For United States.
Ayrshires... ..	93	12
Shorthorns... ..	38	27
Jerseys... ..	38	
Galloways... ..	..	13
Guernseys... ..	5	
Shetlands... ..	5	
West Highlands... ..	3	
Polled Angus... ..	..	3
Total... ..	182	55
Sheep—		
Shropshires... ..	93	24
Dorsets... ..	..	110
Hampshires... ..	8	67
Cheviots... ..	40	
South Downs... ..	38	
Oxfords... ..	15	22
Leicesters... ..	34	
Cotswolds... ..	7	
Total... ..	235	223
Swine—		
Berkshires... ..	27	
Yorkshires... ..	2	
Total... ..	29	
Deer... ..	2	
Goats... ..	1	
Horses... ..	11	

DISTRIBUTION BY PROVINCES.

The 460 animals imported for Canada were distributed by provinces as follows:—

Nova Scotia—	Total.	
Cattle—Ayrshires... ..	4	
		4
New Brunswick—		
Horses—Hackney ponies... ..	3	
		3
Quebec—		
Horses—French coach... ..	1	
Pony... ..	1	
Cattle—Ayrshires... ..	89	
West Highlands... ..	3	
Shorthorns... ..	10	
Sheep—South Downs... ..	24	
Cheviots... ..	30	
Leicesters... ..	10	
Deer... ..	2	
		170
Ontario—		
Horses—Welsh ponies... ..	3	
Highland pony... ..	1	
Cattle—Shorthorns... ..	23	
Jerseys... ..	38	
Guernseys... ..	5	
Sheep—Shropshires... ..	93	
Leicesters... ..	4	
South Downs... ..	14	
Cotswolds... ..	7	
Hampshires... ..	8	
Oxfords... ..	15	
Swine—Berkshires... ..	27	
Yorkshires... ..	2	
		240

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Manitoba—			
Cattle—Shorthorns..	4		
			4
Saskatchewan—			
Sheep—Cheviots..	10		
			10
Alberta—			
Sheep—Leicesters..	20		
			20
British Columbia—			
Horses—Shetland ponies..	2		
Cattle—Shorthorn..	1		
Shetland..	5		
Goat..	1		
			9
Grand total..			460

TUBERCULIN TEST

Of the 237 cattle imported, 55 were tested in England which were consigned for the United States; 2 died before being tested; the testing of 7 was postponed and there were 12 calves under age, leaving 161 which were tested at this quarantine. Of that number 15 reacted and 2 were doubtful.

BIRTHS AND DEATHS.

There were 15 calves born in quarantine, 1 Shetland colt and 2 Dorset lambs, total 18.

There were four deaths, being 2 Jersey cows and 2 lambs.

I have the honour to be, sir,

Your obedient servant,

J. A. COUTURE,
Superintendent.

APPENDIX No. 12.

(J. H. Frink, V.S., Inspector and Superintendent of Quarantine, St. John, N.B.)

SIR,—I beg to submit report covering work at this station for the year just closed.

INSPECTION IMPORT STOCK.

The total number of horses imported into Canada by this port totals 271: 230 imported from Glasgow, 7 from London, 3 from Antwerp, 1 from Liverpool, and 30 from United States.

Made up of the following breeds and classes:—

From Great Britain—		Summary—	
Clydes..	130	From Great Britain.. . . .	238
Shires..	9	From continent.. . . .	3
Suffolks..	5	From United States.. . . .	30
Welsh ponies..	17		
“ geldings..	4	Total..	271
Shetlands..	42		
Hackney stallions..	9	Imports cattle, sheep and swine from	
“ mares..	17	Great Britain—	
“ geldings..	1	Cattle, Shorthorns..	2
Saddle geldings..	4	Sheep, Leicesters..	3
	238	“ Suffolk Down..	2
		“ Cheviots..	3
		Hogs, Yorkshire..	9
From continent—		Total..	19
Percherons..	3		
		Imports from United States—	
From United States—		Sheep, Cheviots..	1
Work and driving..	26	“ Lincolns..	315
Trotting bred..	1	Hogs, Mule Foot..	6
Standard bred..	3		
	30	Total..	322

These animals were inspected, and those quarantined found necessary under regulations governing animals quarantine.

QUARANTINE.

Very few animals have been admitted to quarantine during the year owing in great part to the restriction placed upon the movement of ruminants and swine from Great Britain. The buildings and grounds have been well maintained at quarantine and at present are sufficient for all requirements at this port. Some changes in the arrangement of facilities at quarantine are contemplated which will add to the efficiency of the station.

EXPORT OF LIVE STOCK.

This once flourishing business at this port has almost collapsed and there is no evidence of the resumption. The removal of customs duty on Canadian cattle imported into the United States is increasing, and the too-limited number of cattle in this province is being still further diminished.

Exports to Great Britain from this port:—
500 United States sheep.
1 horse.

To South Africa:—
75 mules.
15 horses.

IMPORTS OF HORSES.

Date.	Owner.	From.	No.
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Welsh Ponies.

April	2....	T. H. Hazzard.....	Glasgow.....	10
"	22....	Hugh Mair.....	".....	1
Jan.	8....	John Miller.....	".....	8

Trottingbred.

April	15 ...	W. H. Miller.....	Boston.....	1
Feb.	18. . .	J. Deethought.....	".....	1
March	24....	Thos. Hayes.....	".....	1

Hackney.

April	22....	F. Cockshutt.....	Glasgow.....	1
"	22....	M. Mansell.....	".....	4
"	22....	T. A. Cox.....	".....	11

Shire.

April	22....	T. A. Cox.....	Glasgow.....	1
Jan.	2....	T. Rawlinson.....	London.....	7
Feb.	11....	T. Bury.....	Glasgow.....	1

Ponies.

Feb.	11..	T. A. Cox.....	Glasgow.....	12
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Standard bred

Nov.	4....	W. A. Cairns.....	Boston.....	1
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INFECTIOUS DISEASES.

GLANDERS.

Inspections and tests have been made for the detection of glanders in many instances, and reactors found in only one importation of working horses from the United States. These animals had been subjected to the mallein test before being shipped from United States. The test charts not being satisfactory they were tested here with above results. Tests have been made of suspects within the province but no disease found. The reactors found at boundary points and information thereto will be found in boundary inspectors returns.

HOG CHOLERA.

An extensive outbreak of this disease was found near Moncton, N.B., in January, occurring among a lot of slaughter-house hogs, which had been fed on uncooked garbage. The disease was confirmed on post-mortem, and having been thus established, Inspector McCuaig was placed in charge and all regulations and orders were strictly carried out. Inspections were made of herds of hogs in the vicinity, but no disease was found, and there has been no evidence of further trouble in the district. The importation of hogs from an infected farm, in the province of Quebec to New Brunswick necessitated the placing of two large establishments under quarantine. The suspected animals and those in contact gave no evidence of disease after three months and were released.

ANTHRAX.

Inspections for this disease were made on reports submitted. These were not confirmed in any case, by post-mortem or microscopical examination.

MANGE.

A report of an outbreak of mange in cattle was made from a parish in Nova Scotia. On investigation the report was not proven and found due to deranged digestion causing skin eruption and aggravated by continuous applications of irritants and absorption of lead from paints.

TUBERCULOSIS.

Inspection and test of cattle for export to United States were made and have been duly reported upon. The use of tuberculin has fallen largely into disuse and there appears to be a reasonable calm in the discussion of milk values and dangers in their relation to public health.

CAR INSPECTION AND CLEANSING AND DISINFECTION.

This work has been carried on as usual, the work falling on the caretaker at quarantine.

Respectfully submitted,

JAMES H. FRINK,
Inspector

APPENDIX No. 13.

(C. H. Higgins, D.V.S., Pathologist in charge, Biological Laboratory, Ottawa.)

OTTAWA, March 31, 1914.

SIR.—I have the honour to transmit this, my fifteenth annual report as an officer of the department, my twelfth as its pathologist.

During the year the work of the laboratory has been more exacting than at any previous period since its organization. The various phases of the work have shown progress proportionate to the amount of time severally allocated to each.

Accommodation was provided during the year for the suitable housing of our small animals. This provision has proven very convenient as we have never before been able to keep an adequate supply of animals for emergency work which at any time may present itself.

Besides supplying all of the small animals that have been required for our own work, we have, at your direction, provided fifty of these animals for the work of various institutions at a nominal charge. Further than this, we have provided one hundred for work at the Lethbridge laboratory. Our stock fluctuates according to the requirements of our work but we usually have on hand about five hundred guinea-pigs and ten rabbits.

The growth of certain features of our work indicates the desirability of our having accommodation for large animals. While certain limited accommodation is now available, the building supplying this is constructed entirely of wood, making adequate disinfection very difficult. We have in the past experienced no untoward results from its use, nevertheless, the anxiety would be greatly lessened if the construction were of an impervious material.

LABORATORY STAFF.

The staff during the year has been similar to that of the preceding year with the addition of Mr. N. M. Guion who was employed during the summer months. He was engaged in collaboration with myself and Dr. Wickware in the investigations on enterohepatitis or black-head in turkeys concerning which more will be said later in this report. Dr. Wickware was absent for the purpose of assisting the work of the laboratory at Lethbridge from April 26, 1913, to August 26, 1913, and again on leave from October 16, 1913, to March 3, 1914, inclusive. During this later period he was taking up work in other laboratories.

Dr. Reid was absent during the first of the year assisting the Faculty of Comparative Medicine of Laval University in Montreal.

I was permitted to attend the fiftieth anniversary meeting of the American Veterinary Medical Association held at New York in September last, where I again had charge of the section on Sanitary Science and Police. I have been asked to assume a similar responsibility for the next annual meeting which is to be held in New Orleans next December.

In December last, I attended the meeting of the American Society of Bacteriologists held in Montreal.

My time has been fully occupied during the year in connection with the various products manufactured, the details of all of which I have personally assumed, save the experimental strangles vaccine which has been in the hands of Dr. Evans. Aside from the exacting duties connected with this manufacture, I have undertaken many original

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investigations connected with specific problems arising in connection with the routine or with special problems presented by other departments or branches of the government service. Many of these investigations are still in an incomplete stage while others are of such a nature that they have been dealt with in special reports which are not of general interest and will not therefore be dealt with in detail in this report. Certain of these investigations have been undertaken in collaboration with other members of the laboratory staff and are presented herewith as appendices to this report in the form of special articles.

During the year, at your request, every opportunity has been afforded Dr. Evans to pursue his inquiry into the subject of contagious abortion in cattle. During the latter part of the year his findings have promised so much, and the demands of this special work upon his time have been so great that I have relieved him, in so far as this has been practicable, of all duties connected with other work of the laboratory. That this has resulted in some personal inconvenience to Dr. Reid and myself in the absence of Dr. Wickware, is apparent from the vast amount of work that has been required in connection with the routine. This has gladly been undertaken and I believe that the results achieved by Dr. Evans have warranted the inconvenience thus necessitated. Personal inconvenience to Dr. Evans has also been a feature of the special investigations with which he has been charged, for at times, particularly when carrying to a conclusion special work connected with the newer methods of diagnosis, and modifications which may from time to time be decided upon, render it necessary for the investigator to practically live with his work continuously through the whole of a number of days.

The scope of the work on contagious abortion has been limited as certain preliminary work was first necessary, but it now seems that the time has arrived when we should, with the results now available, enlarge its scope with a view of arriving at some suitable means for its practical treatment or prevention. Such work can only be carried out on the larger animals and I believe that the time is opportune for us to undertake a comprehensive experiment under conditions which will permit the control of all factors connected therewith. The findings in connection with the work of Dr. Evans will be found in Appendix No. 1 of this report.

Dr. Evans has also been engaged in the preparation of experimental strangles vaccine for the prophylactic treatment of horses which may be exposed to this infection. It is yet too early to draw any definite conclusions from the results that have been secured from its use, nevertheless the indications are that it has some value in dealing with a very troublesome malady of horses. Dr. Evans has compiled the data available which will be found in appendix No. 2 of this report.

Dr. Wickware has undertaken many of the investigations arising in connection with the routine examination of material forwarded for diagnostic purposes. In this regard he has had an exceptional opportunity to study the various methods used in the diagnosis of rabies in which he has become most proficient. An article covering the work which has been conducted with this affection has been compiled by him and is attached hereto as an appendix to this report (Appendix No. 3). He has also assisted in compiling the data on hand at the laboratory in connection with our work on tuberculosis in poultry which is prepared in a form suitable for a bulletin, which may be used in an endeavour to assist in the control of this very serious malady among poultry (Appendix No. 4). The special article on entero-hepatitis or black-head in turkeys (Appendix No. 5) is the result of the joint efforts of Dr. Wickware, Mr. Guiou, and myself. Prior to the special employment of Mr. Guiou in this connection, Dr. Wickware and myself have assumed the responsibility for the detail work connected with these investigations.

Other features of his work relate to the purely pathological examinations which as formerly have been of a very satisfactory nature. Some of the pathological material

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which has been accumulating for many years is very valuable, and I anticipate that Dr. Wickware will in the near future find time for working it up in such a manner as to increase its usefulness.

As already stated Dr. Wickware was absent from this laboratory from April 26 to August 26, during which time he was assisting in the work at the Lethbridge laboratory and on leave from October 16, 1913, to March 3, 1914.

Dr. Reid has been on duty continuously throughout the year save during the period when his services were made use of by the Faculty of Comparative Medicine of Laval University in Montreal, for which purpose he was granted leave. Every assistance was rendered this institution by the laboratory and quite a number of specimens were forwarded for the fuller demonstration of Dr. Reid's lectures. During the year Dr. Reid has been especially charged with the periodical examinations of the water supply of the various government buildings. Many interesting details have developed in connection with this work. During Dr. Wickware's absence he has undertaken a large portion of the routine examinations and in this connection his services have been very satisfactory. He has made some interesting findings in connection with this routine work and some of these details will later be available for publication.

Mr. N. M. Guion was employed continuously from April first to November first. His services were utilized in connection with the experiments on entero-hepatitis or black-head in turkeys. Many facts were secured in the pursuit of this work some of which are presented in a special report which has been prepared and appended hereto as an appendix to this report (Appendix No. 5).

The caretaker, Mr. Fee has rendered excellent service throughout the year, proving as usual, very capable in the handling of the small and such other duties as have from time to time been assigned to him.

Mr. Paquette has attended to the clerical work of the laboratory and, when not fully employed at such duties, his services have been utilized with features of the routine requiring attention.

Mr. Abraham has, aside from aiding Mr. Fee in his multifarious duties, been employed in bottling such products as we have disbursed, other than anthrax and black-leg vaccines and has proven careful in this work.

BIOLOGICAL PRODUCTS.

The manufacture of biological products has continued through the year, each presenting its own problems of which little mention need be made at this time. Your decision to disburse these from your office which is much more advantageously situated for the purpose than is the laboratory, has relieved us of some of the detail work in connection with these products. It has also removed the possibility of mistakes occurring, a feature which occasionally happened prior to this change, as the space intervening between your office and the laboratory necessitated the transmission of names and addresses by telephone. With the disbursements, which have taxed the available staff, we would have found it impossible to cope with the necessities of the work in this regard but for the special labour-saving devices which have been designed for performing various phases of our work.

MALLEIN.

The mallein disbursements for the year show a falling-off, a very favourable indication that cases of actual and suspected glanders are on the decline. The methods employed in its manufacture have not varied from those in vogue during previous years and need not be considered further at this time.

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The total disbursements for the past five years are as follows:—

—	1909-10.	1910-11.	1911-12.	1912-13.	1913-14.
April.....	2,905	9,041	295	2,438	170
May.....	3,525	3,815	2,940	4,417	4,877
June.....	1,440	4,280	4,555	2,201	435
July.....	2,191	4,655	7,595	4,254	3,769
August.....	1,660	2,720	3,735	1,890	1,255
September.....	2,700	2,320	4,395	1,984	610
October.....	2,670	3,005	4,295	2,305	3,600
November.....	2,850	3,281	3,175	2,268	1,500
December.....	1,085	1,920	860	1,234	3,000
January.....	1,760	2,405	4,660	3,239	2,000
February.....	2,290	2,640	3,360	3,001	.....
March.....	7,950	10,030	8,015	8,045	2,000
	32,996	50,112	47,880	37,276	23,216

TUBERCULIN

The disbursements of tuberculin for the year as can be seen by referring to the table given below have remained much the same as for the preceding year. The details in this connection for the past five years are as follows:—

—	1909-10.	1910-11.	1911-12.	1912-13.	1913-14.
April.....	648	654	673	1,023	908
May.....	418	1,178	810	1,196	1,951
June.....	496	568	505	620	900
July.....	887	432	645	770	1,385
August.....	760	544	185	958	724
September.....	335	632	477	549	1,243
October.....	474	381	632	1,410	1,800
November.....	561	801	1,340	1,573	1,500
December.....	488	621	420	1,426	1,050
January.....	282	1,087	899	1,352	1,000
February.....	634	561	420	761	.....
March.....	617	797	957	1,622	250
	6,600	8,255	7,963	13,260	12,808

BLACK-LEG VACCINE.

This vaccine has been prepared as formerly and as will be seen by the figures given below, the disbursements for the current year are greatly in excess of any previous year. This is doubtless due to the fact that our vaccine is becoming better known.

We have in one instance prepared a special vaccine for an outbreak which appeared to be due to an organism of a slightly different variety and in connection with which there was some question as to the degree of resistance afforded by our stock vaccine. I believe it to be desirable to undertake such work when any question arises in this connection, as it not only affords the opportunity to improve our stock vaccine but also to meet what otherwise is quite likely to develop into an antipathy toward the product prepared at this laboratory. The full details connected with this special vaccine have been dealt with in special reports and need no further mention at this time.

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The disbursements for the past five years are given hereunder:—

	1909-10.	1910-11.	1911-12.	1912-13.	1913-14.
April.....	1,330	843	2,076	2,140	5,739
May.....	1,114	2,013	826	2,478	2,900
June.....	1,714	2,866	463	4,966	4,147
July.....	1,007	678	416	1,205	563
August.....	310	427	1,023	1,292	462
September.....	899	569	1,328	658	2,461
October.....	300	4,094	1,019	1,398	7,078
November.....	788	1,801	568	405	7,485
December.....	380	345	463	950	5,560
January.....	136	147	55	241	.....
February.....	4,761	380	188	1,240	400
March.....	730	3,106	1,085	3,475	14,180
	13,469	17,264	9,510	12,448	50,971

ANTHRAX VACCINE.

This vaccine, while used in very small quantities, is still kept on hand in limited amounts for such emergencies as may from time to time arise. While the cost of preparation is greatly in excess of the return, it seems desirable for us to maintain a supply for such requirements as may from time to time arise.

The disbursements for the past five years are as follows:—

	1909-10.	1910-11.	1911-12.	1912-12.	1913-14.
April.....	.....	21	56	.....	28
May.....	38	70	60	50	110
June.....	112	.....	200	50	.....
July.....	47	36	412	116	310
August.....	40	.....	40	57	.....
September.....	62	.....	240	52	.....
October.....	17	32	12	.....	.....
November.....	.....	.....	.....	.....	.....
December.....	.....	.....	.....	62	.....
January.....	.....	.....	6	20	.....
February.....	.....	.....	330	.....	.....
March.....	70	95	.....	.....	.....
	386	254	1,356	407	448

STRANGLES VACCINE.

This vaccine as has already been indicated has not passed beyond the experimental stage, insofar as its routine preparation and disbursement are concerned. Some four thousand doses have been forwarded to your office for distribution among veterinarians. We see no insurmountable difficulty in adding this to the list of products regularly supplied by the laboratory, either as now prepared or in some modification which further experience may determine. The details connected with its preparation have been in the direct charge of Dr. Evans of the laboratory staff and are included as a portion of this report. (See appendix No. 2.)

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A marked increase in the general routine of the laboratory has been noted during the year just ended. There were examined 1,707 series of specimens as compared with 1,399 series, for the year immediately preceding.

Certain features of the work will admit of special mention, while other features of less importance and of little general interest will be omitted.

ABORTION.

This affection as seen in cattle is being dealt with in a special article by Dr. Evans who has had this work in hand, and therefore needs no further mention at this time. Readers are referred to this article which will be found as Appendix No. 1 to this report.

ENTERO-HEPATITIS.

The progress made with this disease during the year was greater than for a like period during any preceding year. This may be accounted for through the accumulated experience of the laboratory staff and the fact that Mr. Guiou was able to give this work a greater amount of attention during his employment than has been possible by any other member of the staff during a similar period. We are making progress in this work and it is to be hoped that with the data already available together with the more comprehensive scheme on which the investigations are to be conducted, that another season will see a considerable advance over our present knowledge.

The reader is referred to Appendix No. 5 for details in this connection. It is impossible for us to include in this special report many of the minor experiments which we have conducted as some of these require still further observations for their full corroboration and this data may be looked for at a later date.

FOXES.

The services of the laboratory have been requisitioned to assist the newly developed fox industry in overcoming some of their losses. As each individual animal is valued at a very high figure, the prevention of any losses means a considerable financial gain, not only to the party or parties directly concerned but to the livestock industry as a whole. To advise with respect to the prevention of deaths occurring at remote points among wild animals in captivity is a very difficult task. While we are able to arrive at the cause or causes which result in the death of an individual, we cannot advise what methods are required to overcome the conditions which result in such losses.

Each case has been dealt with through the medium of a special report and, therefore, requires no further mention at this time.

STERILIZATION OF PAPER CURRENCY.

Under the provisions of the Bank Act, passed in June, 1913, provision was made for the adoption of regulations providing for the sterilization by the banks of notes used as currency. To comply with the provision above set forth, this laboratory was requested to undertake the examination of notes in this connection.

We have completed our experiments, and I may here express my appreciation for the marked interest taken during its progress by Mr. J. E. Rourke, Comptroller of Currency for the Finance Department. Without the suggestions which he has from time to time been able to offer, we would have been unable to thoroughly understand some of the features having a very important bearing on the work. It is gratifying to note that as a result of our investigations into this problem, Mr. Rourke has been able to have a device constructed which adequately meets the demands of the situation.

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It is not our purpose to enter into the details of the experiments undertaken, as these are very technical in their nature, and have been the subject of special reports transmitted to the Finance Department through your office.

It may be of interest to mention that the main conclusion reached as a result of experiments extending over a period of some months was that practical requirements would be met by the subjection of notes to heat at 80° C. for a period of four hours, this being sufficient to destroy the vitality of the infective agents commonly transmitted from man to man by fomites. This temperature would not, however, destroy the spores of anthrax or tetanus.

The work was checked by infecting notes with a very virulent form of *staphylococcus pyogenes aureus* (*Aurococcus*) and subjecting these in a special electric sterilizing device which Mr. Rourke had constructed for the purpose. This having been found efficient in destroying the infection with which we were experimenting, it was but natural for us to reach the conclusion above recorded, namely that an exposure to 80° C. for four hours would destroy the vitality of the organisms most liable to transmission through the medium of paper currency.

This special device was operated at the laboratory for over a month, during which time a record of the temperature was kept, and the fluctuations were found to be less than two degrees centigrade. This is within the limits of safety, as notes subjected to a slightly higher temperature than that decided upon for a period of two weeks failed to show a deterioration in the fibre of the paper or in the permanency of the ink.

POULTRY.

Our poultry work has been continued on much the same lines as those which have been pursued during former years. The calls for this work are increasing, and I believe that this indicates that there is a fuller appreciation of the benefits to be derived from learning the exact cause of unthriftness and death in given instances. It is but natural that as our experience in this connection has increased we have become more expert in our examinations and thus better able to assist interested parties.

We append hereto as Appendix No. 3, a special report covering the work with tuberculosis in poultry, and our recommendations in connection therewith. We have also prepared our results with entero-hepatitis or black-head in turkeys in the form of a special report, which will be found as Appendix No. 5 of this report. With the latter we append our conclusions, which may be of interest to those engaged in turkey raising.

We have performed a large number of autopsies on fowl that were specially fed with weed seeds by the Poultry Division of the Experimental Farms Branch. In the main, our findings resulted in the conclusion that none of the seeds being used could be considered as distinctly poisonous. Certain varieties, however, checked the growth of the birds in question, while one variety gave results which indicated that it was equally as efficacious in increasing the weight of birds as the best food obtainable. The full data of our work in this connection are contained in a special report covering the whole subject, and, as it is of little value without the data secured by the Poultry Division for purposes of comparison, it is not included as a portion of this report. Mr. Elford advises me that he proposes including the data secured by us in a special report which he is preparing, and to which the reader is referred.

As a result of our examinations of poultry, and the observations which we have from time to time made, we have been led to the conclusion that there is too little at present known about the physiology of the digestive function in these animals. It is our belief that when this question is actively considered, that it will be found that the *cæca* or *blind guts*, exert a marked effect upon the digestive process. Just what this effect is can only be determined by accurately conducted experiments, and we mention our belief here with a view of stimulating some investigator who will have the time and inclination to consider this problem with a view of aiding in its solution.

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The pathology of poultry diseases is gradually becoming a more and more important problem. This is largely the result of the increased attention which is being given to the improvement of the industry through breeding a higher type of fowl for the purely commercial features of the poultry business. Fowls bred to lay are commanding enormous figures, and will continue to do so until the average fowl is a high producer. With this increased productiveness along a given line, there is a marked tendency to undermine the constitution of the bird in some vital factor, with the result that the individual bird is useless, or succumbs to the most minor infection. Greater attention will necessarily have to be given to the purely physiological and pathological considerations than has heretofore been thought necessary. In this regard we anticipate that we will be able to make some progress owing to the fact that the Poultry Division of the Experimental Farms Branch is desirous of co-operating in this work with a view of reducing the preventable losses which are excessive. The many problems presented require investigations being conducted at first hand and we anticipate that this will be possible during the coming year to a greater extent than at any previous period.

WATER EXAMINATIONS.

Examinations of water have been conducted as during former years. These have been carried out as a routine procedure in determining the efficiency of the special sterilizing machines installed in the various government buildings. We have failed to find one of these machines giving anything but satisfactory results when properly installed. In one instance some trouble was experienced which was found to be due to the existence of a by-pass valve which could be opened in emergencies. With an increase in the capacity of the machine and the elimination of this by-pass no further trouble has been experienced.

TUBERCULOSIS.

During the year a considerable amount of experimental work with this disease has been conducted in connection with the routine. The major portion of the experiments which have been started are as yet incomplete, and therefore cannot be reported in detail at this time. We have also in hand some experimental data concerning the viability of the tubercle bacillus under varying conditions, both in cultures and tissues. These naturally require a considerable period of time to elapse in order that sufficient data covering many minor points may be completed.

Dr. Reid has found in the routine examination of specimens that tuberculosis has been the cause of specific lesions in sheep on two occasions. He is securing further data in this connection which will at some later date be available.

In closing my report, I desire to express my appreciation of your interest in the work of the laboratory and the encouragement which you have from time to time offered for increasing the efficiency of various phases of our work.

I have the honour to be, sir,

Your obedient servant,

C. H. HIGGINS

Pathologist.

APPENDIX No. 14.

(*T. C. Evans, V.S., Assistant Pathologist, Ottawa.*)

EPIZOOTIC ABORTION INVESTIGATIONS.—(INTERIM REPORT.)

The primary investigation into the disease known as Contagious Abortion in cows commenced in the spring of last year.

A previous letter covers bacteriological examination of uteri of pregnant cows at the Toronto and Montreal abattoirs. It was desired to ascertain whether it was possible to obtain a culture of the bacillus of Bang from the uterine contents of these animals in various stages of gestation. With this end in view, over 140 cases were examined, and material from each one brought to the laboratory for inoculation and cultural purposes.

In none of our plantings was it possible to identify colonies resembling those described by workers on this disease, and as many as 95 per cent of our culture tubes showed no growth at the end of four weeks incubation. Aspirations from the inner surface of the uterus and from the viscera of the foetal calves were sown directly upon the surface of the tube media while at the abattoirs and brought back to the laboratory for incubation.

During the early part of the summer I proceeded to London, Ont., to inquire into a report upon an alleged outbreak of epizootic abortion, occurring among certain herds of cattle in that district. A number of farms were visited, and a list made to determine the extent of the losses in this connection. During the two weeks stay in this locality no new cases presented themselves and I returned to Ottawa without being able to secure any material for the furtherance of our work.

The results in both the above instances are dealt with in detail in letters to you and therefore it would not seem necessary to enter into particulars here any more than to mention that up to that period we were without positive evidence of the disease in Ontario.

We were very fortunate in being able to continue the work last fall close at home within a few miles of the laboratory, owing to an outbreak of contagious abortion occurring in the neighbourhood. Later in December, two veterinarians, Dr. Hollingsworth, Municipal Food Inspector, and Dr. Harris, a practitioner, both of Ottawa, reported the existence of this disease in two dairy herds supplying milk to the city. Although rather unfortunate from the farmer's point of view, to say the least, it undoubtedly benefited the work and was the means of supplying an abundance of material from which the bacillus of Bang was isolated.

The microbe of contagious abortion of cows presents remarkable biological characteristics. The many difficulties attending its early cultivation in pure culture, have been vouched for by many workers. However, in a thoroughly equipped laboratory, with proper apparatus, these difficulties are easily overcome.

The winter had fairly well settled in before the commencement of this work, and we were hampered to some extent by inclement weather and bad roads. It was really intended to show in a more comprehensive way the results following injections of city milk into guinea-pigs in order to demonstrate that the abortion bacillus does exist in the milk of aborting cows, and is pathogenic to guinea-pigs. This experiment proved successful and we obtained pure isolations from guinea-pigs dying from this source.

Later milk inoculations had to be discontinued owing to insufficient heated accommodation in our building. We ran no risk of infecting our healthy stock and kept all milk inoculated pigs entirely segregated from the breeding house.

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In the results following the inoculation of guinea-pigs with milk, 10 per cent of the deaths were due to excessive cold alone. It is desired that a thorough series of experiments with milk from various dairies supplying raw milk be made this spring and summer in the endeavour to determine if the bacillus of abortion be present in any of these supplies and if so in how many.

The outbreak of abortion previously referred to existed in the herds of four dairy farms, all within a radius of 12 miles of Ottawa. The only explanation which could account in any way for the introduction of the disease into these herds was the purchase of a cow from premises which were believed to have been infected several years before. This cow no doubt was the nucleus for the infection and, before any clinical signs were apparent, two heifers were sold to another dairyman who later on developed abortion in his herd. Both of these herds were free from the disease previous to last summer.

The paper of Schroeder and Cotton on the presence of the etiological factor of contagious abortion in the milk of aborting cows is responsible for our using the milk as material for inoculation. Other vehicles were the placenta cotyledons and the viscera of the aborted foetus, from which pure cultures were obtained by plantings.

PHYSICAL PECULIARITIES.

Experiments have demonstrated that the bacillus of Bang is one that is neither aerobic nor anaerobic. According to Nowak it occupies a position between the two. For a successful growth it requires only a certain amount of oxygen and unless this condition is provided, it is slow to develop in the primary plantings. While the majority of our early cultures were obtained under the Nowak method, we did obtain growths in tubes from stomach plantings where the growth appeared on the solid surface of the media without us altering the atmospheric content. Rubber caps were placed upon these tubes to prevent evaporation, and they were incubated in the ordinary way at 37° C. for three weeks.

MATERIAL.

All material from aborting cows was brought to the laboratory with as little delay as possible, except on days when the condition of the roads rendered travelling difficult. It was found that freezing of the foetus for a period of from a few days to two weeks did not destroy the bacillus, as most of our material was frozen when arriving at the laboratory. Some of our material had been subjected to a temperature of 20° below zero; such had to be thawed before aspirations from the abdominal viscera could be obtained. In cows where the afterbirth was retained and it was desired to obtain material therefrom it was usual to remove same under strict aseptic conditions. Small pieces of the placenta cotyledon were cut off and placed in sterile vials, brought to the laboratory, together with a sample of the milk and the foetus.

Microscopic examination of smears made from the degenerative material of the placenta generally showed the presence of the abortion bacteria in great numbers. Slides from the stomach contents seldom exhibited the presence of the bacillus on microscopical examination, although plantings from the same source often gave positive results in the culture tubes.

CULTIVATION.

Bang was successful in obtaining isolations from the foetal heart blood, various portions of the viscera and from the inner surface of the uterus. The media used in the work for isolating the organism in this laboratory were Stribolt and Nowak's gelatin-serum-agar. Later, in a few instances, we have been using a 1 per cent glycerin-grape-sugar-agar with good results. For successive generations the ordinary media such as are used in laboratory routine grow the bacillus well.

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The tubes and plates are placed in ordinary specimen jars with a tight-fitting ground cover or in a wide-mouthed bottle fitted with a pure rubber stopper. To provide favourable atmospheric conditions, the bacillus subtilis, a vigorous aerobe, is cultured together with the abortion tubes and plates in the jars. The bacillus subtilis requires oxygen for its growth and absorbs a certain amount from the air in the jar according to the surface of growth and the amount of space in the jar. The usual allowance is one square centimetre of the subtilis to fifteen cubic centimetres of space.

The length of time it takes for the colonies to develop varies. In some instances they are apparent to the naked eye in four days although in some cases it was as long as ten days before they were observed. On the surface of the medium they appear as small transparent drops of water, with a shimmering greenish cast. Transplanted in the third and fourth generation, this transparency is lost and the colonies assume more of a rusty colour.

MORPHOLOGY.

Slides made and stained reveal a small bacillus not unlike the organisms of bovine tuberculosis. With dilute carbolie fuchsin the staining is uneven and granular. It does not retain the dye in the presence of acid or alcohol. The bacillus stains with all the common dyes. It is non-motile and does not retain its stain when treated with the Gram method.

LATER CULTURES.

Our cultures possessed a retarded growth on culture media in the incubator for a number of generations. After several weeks, however, they seem to accommodate themselves to the artificial environment, and grow fairly rapidly.

A good growth was obtained in a 1 per cent glycerin-sugar broth after the fourth transpant. Potato solid media is also excellent, and gives vigorous growths. In flasks where the air has been replaced by coal gas and CO₂ it also flourished.

GOATS.

The theory held by many farmers and stockmen that the presence of a goat among cows prevents this disease was responsible for an experiment worth recording. The efficiency of this animal is frequently vouched for even in this enlightened age. We inoculated a pregnant goat with a saline suspension (containing 1 mg. to 5 c.c.) of the bacillus abortus (5683) isolated at the laboratory on December 20. Five cubic centimetres of this suspension was introduced through the jugular vein with a fine hypodermic needle. Although the injection was made very slowly, a little dyspnoea was noticed for a few minutes after the dose. This animal aborted a dead foetus on the thirteenth day following the injection. Aspirations from the foetal viscera on 1 per cent glycerin-agar gave an excellent growth on the fourth day.

STRAINS FROM DIFFERENT SOURCES.

We have a number of strains of the bacillus from different isolations made at the three farms. These include cultures made from milk, from the viscera and, in some cases, from the placenta.

Strain No. I.—From a dairy herd consisting of over forty cows; never had the disease before on the premises.

Strain No. II.—Obtained from a farm within 12 miles of Ottawa; first time in a great number of years that this disease has affected these cows.

Strain No. III.—These include later isolations from a large herd on a new dairy farm. This dairy is purchasing cows from various parts of the provinces of Quebec and Ontario and cannot therefore offer information as to the origin of the disease.

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Strain. I.

- Cow No. 5484. Milk isolation, obtained December, 1913.
Cow No. 5487. Milk isolation, obtained December, 1913.
Cow No. 5486. Milk isolation, obtained January, 1914.
Cow No. 5496. Milk isolation, obtained January, 1914.
Cow No. 5683. Isolated from foetus, December, 1913.
Cow No. 5690. Isolated from placenta, December, 1913.
Cow No. 5868. Isolated from foetus, February, 1914.

Strain. II.

- Cow No. 5689. Isolated from foetal stomach, December, 1913.
Cow No. 6112. Isolated from foetal stomach, March, 1914.
Cow No. 6113. Isolated from foetal stomach, March, 1914.

Strain. III.

- Cow No. 6006. Isolated from viscera of foetal calf, February, 1914.
Cow No. 5946 represents culture No. 5683, after passage through goat.

ISOLATIONS FROM MILK.

The remarkable discovery of G. C. Schroeder and W. E. Cotton on the persistence of the abortion bacillus in the milk of cows, and particularly the demonstration of the fact that in one case it was eliminated from a cow's milk for four and a quarter years is a most interesting contribution to what was already known concerning the bacillus. As far as our preliminary investigations have gone in this direction we find that the bacillus is present in the milk of cows in the herds we are using for our work, and this milk injected into healthy guinea-pigs does produce pathological lesions and death.

We collected in November, last year, a number of samples of milk from cows which were known to have aborted. Utmost regard was given to aspsis in order to eliminate all possibilities of extraneous contamination. Sterile tubes were filled by squirting the milk therein from some distance. With this milk guinea-pigs were inoculated intraperitoneally with quantities from 5 to 15 cubic centimetres.

Before injecting, the milk was warmed to prevent shock. We find that guinea-pigs can accommodate large quantities of milk without any discomfort. Workers in this laboratory have used as high as thirty cubic centimetres without untoward results.

The first guinea-pig died on the thirty-sixth day following the infection, the second on the forty-fifth day, and several between this later period and the fifty-sixth day. Post-mortem examinations of these pigs revealed the characteristic enlargement of the spleen. The lymphatic glands presented signs of degeneration. The liver was enlarged, with whitish spots throughout its substance. In some of our guinea-pigs the characteristic changes in the organs were not so pronounced as recorded by Schroeder and Cotton, but this may have been due to the cold quarters reducing the vitality of the small animals so that they died before any great degenerative changes had taken place. Further, our organism may be of a greater virulence. In all our autopsies the clinical lesion in the spleen was taken as suggestive of infection and it was from this organ that our cultures of abortion were obtained. Spleen pulp spread over the surface of the solid tube media gave excellent growths in reduced oxygen. The bacillus obtained in these cultures possessed more rapid-growing qualities than those obtained from material in the original host (the placenta and uterine contents).

SERUM DIAGNOSIS.

One of the most important studies in connection with contagious abortion in cows is a reliable method of diagnosis. In September, 1909, Holth published his report on the agglutination and complement fixation for determining the presence of this disease. The fact that serum tests do not, so far at least, offer a means of distinguishing between cows which are actively infected and those which have possibly acquired an immunity, is a noteworthy fact. However, as Walls work on this subject demonstrates that agglutinins and immune bodies gradually disappear, in from six months to a year, it would be reasonable to suppose that a cow showing a high agglutination and fixation is to be looked upon with suspicion when it comes to a question of their introduction with a non-aborting herd. On an attached sheet are shown a number of serum tests secured with the blood of animals known to have been affected as the serum was secured from recently aborted cows. In the same group we obtained serums from cows and heifers which have not aborted but have been exposed to infection. In the second series the serum was from cows which were never known to abort. As controls, serum from horses and goats were used with negative results. Up to the present time the agglutination tests made have been conducted with about one hundred cows. For purposes of comparison the tables show the results secured from forty-six. The serums of cows from farms where abortion has not existed does not agglutinate in dilutions higher than 1:50. With one exception, all serums of aborting cows have given a positive agglutination in dilutions from 1:100 to 1:500, the exception being a cow which had aborted twice but fails to give an agglutination higher than 1:100. The ease by which an agglutination test can be made and its seeming reliability as confirmed by Bang, McFadyean, Stockman, Brull, Zwick, Holth, and Wall would seem to indicate that the method could be used with success. McFadyean and Stockman of the English Abortion Committee have thoroughly tested this method for its reliability. Of 535 steers, bulls, and calves, which prior were assumed to be not affected, there were only nine which gave an agglutination in a higher dilution than 1:50, four in a dilution of 1:100, and only one in a dilution of 1:200.

FIXATION OF COMPLEMENT (affected cow).

1Antigen.	2Cows serum	3Comple-ment.	4Saline.	5Haemolysin.	6Cells.	Results.
2		.5	.5	1 0	1 0	Complete.
1	0.2	1 0	.8	1 0	1 0	No haemolysis.
1	0.15	1 0	.85	1 0	1 0	"
1	0.1	1 0	.9	1 0	1 0	"
	0.2	.5	2.3	1 0	1 0	Complete
	0.2	.5	3.3	.....	1 0	No haemolysis.

1. Antigen extract 1 c.c. is dose or half the quantity which will not prevent haemolysis.
2. Inactivated cow serum 30 minutes at 55°C.
3. Complement of guinea-pig, quantity determined by previous titration.
4. Physiological salt solution, .85 per cent.
5. Double smallest quantity of sensitised rabbit serum, determined by titration.
6. 5 per cent saline solution of goat blood cells.

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COWS AND HEIFERS from Aborting Herds.

Date.	Agglutination.					Comp. Fixation.	Remarks.
	1:20	1:50	1:100	1:200	1:500		
1 September, 1913	+	+	+	+	-		
2 " 1913	+	+	+	+	-		
3 " 1913	+	+	+	+	-	+	Never aborted.
4 December, 1913	+	+	+	+	-	+	
5 " 1913	-	-	-	-	-	Heifer.
6 " 1913	+	+	+	+	-		
7 " 1913	+	+	+	+	+		
8 1912	+	+	+	+	-	+	First calf.
9 January, 1914	+	+	+	+	-	+	
10 " 1914	+	+	+	+	+	+	
11 September, 1912	+	+	-	-	-		
12 1912	-	-	-	-	-	Heifer.
13 September, 1912	+	+	+	+	-	+	
14 1912	-	-	-	-	-	+	Heifer.
15 1912	+	+	+	+	-	Heifer.
16 January, 1914	+	+	+	+	+	+	
17 1912	+	+	+	+	-	+	Heifer.
18 1912	+	+	+	+	+	+	
19 1912	+	+	+	+	+	+	
20 1912	+	+	+	+	+	+	
21 1912	-	-	-	-	-	-	
22 1912	-	-	-	-	-	+	
23 January, 1914	+	+	+	+	+	+	
24 " 1914	+	+	+	+	+	+	
25 March, 1913	+	+	+	+	+	+	
26 1913	+	+	+	+	+	+	Heifer.
27 1913	-	-	-	-	-	-	Heifer.
28 1913	-	-	-	-	-	-	Heifer.
29 1913	+	+	+	-	-	+	Heifer.
30 1913	+	-	-	-	-	-	Heifer.
31 January, 1914	+	+	+	+	+	+	
32 September, 1913	+	+	+	-	-	+	
33 June, 1913	+	+	+	+	+	+	
34 1913	+	-	-	-	-	+	Heifer.
35 1913	+	-	-	-	-	-	Heifer.
36 September, 1913	+	+	-	-	-	+	

COWS AND HEIFERS from a Non-Aborting Herd.

Date.	Agglutination.					Complement Fixation.	Remarks.
	1:20	1:50	1:100	1:200	1:500		
1 December, 1914	-	-	-	-	-	-	
2 " 1914	-	-	-	-	-	-	
3 " 1914	-	-	-	-	-	-	
4 " 1914	-	-	-	-	-	-	
5 " 1914	-	-	-	-	-	-	
6 " 1914	-	-	-	-	-	-	
7 " 1914	-	-	-	-	-	-	
8 " 1914	+	+	+	-	-	-	
9 " 1914	-	-	-	-	-	-	
10 " 1914	-	-	-	-	-	-	

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In addition, we have used the complement fixation test in some cases along with the agglutination using the washed red blood cells of the goat, amboceptor from the rabbit previously sensitized with washed blood cells of the goat, complement from the guinea-pig and antigen from broth cultures of the bacillus abortus.

Although our work with this method of diagnosis has been used only in a few cases compared to the agglutination test, the results have been quite satisfactory and with the exception of one case the combined tests gave the same results.

This year, if possible we are anticipating conducting experiments with a view to producing immunity. We realize that in order to obtain definite results it will be necessary to have a number of mature heifers and a bull and that these animals will come from herds known to be free from abortion.

It would seem reasonable to experiment with bacterial preparations in preference to expensive alien substances and now that we have a number of isolations of virulent and avirulent cultures we are in a position to determine the efficiency of vaccination.

To attempt work along these lines we should commence on a non-aborting herd owing to the fact that immunity may be acquired after an active infection when a number of abortions have occurred in the same animal. Before such experimental animals are purchased, their serums should be tested to ensure the work being commenced with non-infected animals.

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APPENDIX No. 15.

STRANGLES VACCINE (EXPERIMENTAL).

(By T. C. Evans, V.S., Biological Laboratory.)

Since 1910 experiments have been conducted with suspensions of the *streptococcus equi* in the endeavour to produce an efficient vaccine for the prevention and treatment of strangles in the horse. So far the work has shown satisfactory results in such a degree that the Veterinary Director General instructed us to prepare a larger quantity last fall and authorized its free disbursement to practising veterinarians with a view to obtaining a general consensus of opinion as to its merits.

In studying the value of vaccine therapy applied to strangles the following facts regarding the alleged specific organism are available:—

(a) Strangles or *febra pyogenica* is a contagious febrile disease of the horse characterized by high fever, great depression, discharge from nasal chambers and very often glandular enlargement and breaking down particularly in the submaxillary lymphatic glands.

(b) That in all cases, whether from the benign flow of lymph from the nostrils, or from the broken-down cellular discharge from abscesses, the *streptococcus equi* is present in great numbers.

(c) That although there has been no evidence to show that the disease can be produced by inoculation of the *streptococcus* into a healthy horse we have been able to produce *pyemia metastasis* in smaller domestic animals and recover the germ again in pure culture.

(d) That it is possible to immunize healthy horses and smaller animals against analogous infections by subcutaneous injections under the skin of a killed culture prepared in the laboratory.

Exhaustive experiments have been conducted by Captain Todd of the British Army Veterinary Department, and many other European workers, in an effort to produce a characteristic attack by introducing material containing the microbe into the economy of healthy horses without very much success.

Some workers claim that there is a predisposing factor which acts in conjunction with the *streptococcus equi* in bringing about an attack. Baruchello found *streptococci* in faeces of horses which he considers harmless habitants of the intestinal canal but which may become harmful under certain conditions. Schutz considers his variety an independent species, while Foth believes it to be identical with Schutz *diplococcus* of influenza. Attempts to raise the virulence of a strain of *streptococcus* have been successfully carried out whereby it is more pathogenic to small animals and it is interesting to note that in so doing its morphological appearance changes to a remarkable degree. This may be termed a process of evolution because in initial stainings of the organism on slides from actual pus the *streptococci* are seen to be very small perfectly spherical bodies occurring in chain-like formation. These chains are very long and usually curved and twisted. Cultures obtained on various media from this source are invariably avirulent and non-pathogenic to mice. However, if the pus is obtained perfectly fresh and small quantities are inoculated into mice we can obtain a pure culture of an organism presenting microscopically more of an oval shape, and as successive inoculations from the same strain proceed we secure more of a perfect cylindrical disc. Quantities of pus from discharging abscesses and their metastases in horses have been inoculated into rats, guinea-pigs, and rabbits without producing death by

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pyemia. If large quantities of pus are injected into the abdominal cavity of these animals they produce death by septicemia and toxemia, although we have not been successful in isolating a pure culture from their blood afterwards. Very small quantities injected subcutaneously into the rump of white mice produce a pyemic infection with involvement of the lumbric lymphatic glands and metasis. The rats, guinea-pigs, and rabbits treated the same with a corresponding amount fail to die from this condition. The organism after passage through the mouse will destroy young guinea-pigs even if administered in small amounts. An isolation of streptococcus direct from pus is not considered suitable for preparing an effective vaccine and we have therefore resorted to the above outlined method of raising its pathogenicity before attempting to make a potent preparation. In all experiments made for the purpose of testing the vaccine for its immunizing properties, we have used strains passed through one and two white mice determining its virulence by inoculating unprotected mice. A killed suspension containing the dead bodies of the cocci of this accentuated strain was found to protect white mice against subsequent infection when small quantities were injected under the skin.

Different strains of the streptococcus obtained from various sources were found to vary in pathogenicity. All the strains used for inoculation were first passed through the mouse. Only about 50 per cent were found to be pathogenic as the swabs were sometimes delayed in transmission and during this time subjected to a high temperature. These agencies may have killed the streptococcus although we found that it was impossible to infect some of the mice which had previously received inoculations of pus from these swabs. The disease in the mouse follows a definite course. Those dying of septicemia or toxemia were useless. The marked lesions are in the visceral lymph glands and from these we were able to obtain a pure culture in our various media.

At camp Petawawa where early work with the vaccine was conducted an excellent opportunity was afforded to test out its therapeutical value. Later it was used in connection with city practice in Montreal, Toronto and London.

On the 18th of May, 1913, eight hospital cases of strangles of the malignant type received a subcutaneous injection of "vaccine" consisting of two cubic centimetres of a three weeks' growth, killed suspension. A second injection was administered on the 21st, and on the 24th a material change was observed both in the appetite and temperature. Reports from a veterinary inspector at Toronto gave corresponding results. The veterinary officer of the 6th London Battery recorded a number of cases resulting from contact at Petawawa camp. These animals received "vaccine" treatment exclusively, temperature charts being furnished while the remainder of unaffected animals received immunizing doses. On the 9th June, 1913, the horses of one squadron of cavalry were given immunizing doses before entraining. On the 14th June the squadron entrained and spent five weeks at camp. During that period they remained free from strangles, and returned to barracks to be turned on to pasture for one month. The last report was to the effect that no strangles had occurred in these animals.

Last fall several thousand individual doses were prepared and labelled "Experimental Strangles" vaccine. This was supplied gratis to practising veterinarians by the Veterinary Director General on condition that they report upon its use, and results and opinion following same be forwarded to the department. The following letter accompanied each disbursement.

EXPERIMENTAL STRANGLES VACCINE.

"Experimental Strangles" vaccine has been prepared at the Biological Laboratory, by growing in a special serum media, a number of strains of *streptococcus equi* isolated from the pus of horses naturally infected with strangles. The cultures have been passed through experimental animals to accentuate their virulence. The vaccine is put up in three cubic centimetre ampoules preserved with the addition of glycerine and 0.2 per cent trikresol, and it is ready for immediate use.

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This amount is judged by experiments to be the appropriate maximum dose for the average horse gauged so as to induce the maximum production of anti-bodies with the least physiological reaction.

Individual judgment, however, is necessary in certain cases. For instance where the vitality of the animal is low, as in malignant cases, it has been found that half the ampoule is a safe dose gradually increased in succeeding amounts until at the end of ten days, two ampoules may be safely administered in one dose.

When used to protect (prophylactic) one-half the ampoule may be given followed in two or three days by the full amount. In immunizing colts under one year of age take half the above dosage.

In using the vaccine in the treatment of active cases the best results have been obtained in giving it at the commencement of the illness. It has been safely given in full doses where the fever has been as high as 105° F., however, in cases showing prostration half the ampoule should constitute the first dose, followed in three days by the full amount.

ADMINISTERING THE VACCINE.

The glass ampoule is shaken to bring into suspension the dead bacteria in the precipitate. The ampoule should be shaken eighteen times. A hypodermic syringe with a glass barrel is most suitable and must be boiled before use. This is essential as the vaccine would easily become contaminated by using a dirty syringe. Rinsing the syringe in a strong disinfectant solution is fatal to the action of the vaccine and must be avoided.

After thorough shaking, break the neck of the ampoule at the file mark and draw off the contents through the needle of the syringe. Injection is made subcutaneously whether in the neck or in the loose skin of the breast at the sternum. The site for injection should be first painted with tincture of iodine.

Great care must be taken in the preservation of this product as our experiments have not indicated what deterioration may be anticipated and we would suggest that it be stored in a refrigerator or in a cool dark place where the temperature will not vary to any great extent.

The method of determining dosage was arrived at by giving varying amounts to a number of typical cases and noting results. For instance three horses affected with strangles in which there was marked depression received in each case six cubic centimetres at four days interval. In each instance the injection was followed by a profuse and stubborn diarrhoea. As the relations between the three were similar it was not considered an individual idiosyncrasy and the average dosage was then reduced to half the amount. Three cubic centimetres of this batch of vaccine did not produce serious depression when given subcutaneously, and this quantity was accepted as the maximum suitable amount. In associating the streptococcus with strangles we do so for reasons that have been set forth by all workers on this subject and even if the streptococcus does require some other factor for producing this disease we are quite certain by its evidence in all cases of strangles that it is the organism that occupies a most important part.

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- Captain A. G. Todd, A.V.C., Vet. Journal, 1910, p. 440.
Hutyra and Marek, vol. 1, p. 366.

APPENDIX No. 16.

RABIES.

AND THE SPECIFICITY OF NEGRI BODIES.

(A. B. Wickware, V.S., Biological Laboratory.)

It is only within comparatively recent years that rabies as a disease entity has occupied the minds of professional men, being regarded by many members of the old schools as a myth, and not as a concrete affection. The researches of Pasteur demonstrated its infectious nature and a means by which its fatal termination might be avoided. More recently, however, through the brilliant researches of Negri and other investigators, the disease now receives full recognition and as a result of the number of agonizing deaths attributable to rabies, both in human and lower animals, a profound study has been carried on relative to its etiology, prophylaxis and cure. The result of these researches has been the absolute control of the disease in England, while in many other countries, only sporadic outbreaks are now observed.

With the object in view of establishing to our own satisfaction the reliability of Negri bodies as a diagnostic finding and also the making of a general investigation of rabies from a laboratory standpoint, studies were commenced in the year 1908, and have been continued until the present, whenever material has been available for such purposes.

Observations have not alone been confined to diseased or infected animals but comprise also a large number of normal dogs obtained for the purpose of substantiating the evidence derived from our investigations as to the specificity or otherwise of the bodies described by Negri as being indicative of rabies in both human beings and the lower animals.

Much has been written of a controversial nature, both for and against the contention that these bodies are always present in positive cases of this disease, but very little evidence of a statistical nature is at present available in support of either view.

In 1908, during the outbreak of rabies in western Ontario, which assumed rather startling proportions and at which time numerous individuals were bitten, the writer unfortunately inoculated himself while conducting some experiments on rabbits, thus necessitating subsequent treatment at Toronto. This unforeseen circumstance resulted in much additional routine work being assigned to the other members of the staff, hence, owing to pressure of work and personal experiments which required their undivided attention, examinations for Negri bodies were not conducted at the laboratory, animal inoculations being given precedence. These latter involved less time and gave incontrovertible evidence as to the existence or non-existence of rabies in the suspected individual cases.

As a result of this mishap, much valuable data relative to the subject in hand were necessarily lost and, owing to the subsidence of the outbreak shortly afterwards, due to the rigid quarantine methods instituted by the department, an opportunity to carry the investigations further was rendered impossible except at rare intervals.

In 1903, Negri, an Italian investigator described certain cell inclusions appearing in the brains of animals dying of rabies. These inclusions were found principally in the ganglion cells of the hippocampus major and the Purkinje cells of the cerebellum. Much speculation has been made as to their exact nature, some maintaining that they are parasitic while others look upon them as cell degenerations. Notwithstanding

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these diverse views, it has been demonstrated that they are present in nearly 98 per cent of the type known as street rabies and in these positive cases confirmatory results are always obtainable by animal reactions. The evidence adduced by our investigations is that the finding of Negri bodies is absolute proof of the existence of rabies, but the negative finding does not entirely exclude its presence. That such is the case is instanced by a specimen received recently from western Ontario in which an examination of the brain failed to reveal the presence of these bodies while slide preparations from inoculated rabbits dying twenty-three days thereafter, contained Negri bodies in countless numbers. Another abnormality, which it may not be irrelevant to mention at this time, is the change described by Van Gehuchten and others as present in the sympathetic and cerebro-spinal ganglia, especially the gasserian ganglia of affected animals. Normally the structure consists of a supporting network in which are found ganglion cells enclosed in a capsule lined with epithelium. In affected animals, on microscopic section, the nerve cells appear to be shrunken and surrounded by proliferated epithelial cells. However, a similar condition has been noted in the nerve centres of the dogs suffering from other affections so that now these lesions are not regarded as being pathognomonic of rabies.

In conducting our examinations for the detection of Negri bodies in both apparently normal and suspected individuals, control slides from positive sources are employed as considerable manipulation of the stains is required to obtain the best possible results, owing to a marked variability in the affinity possessed by certain nerve cells for a selected stain. In examining smear preparations it is advisable to make at least ten slides providing positive results are not obtained in a smaller number, as occasionally in a series often of twelve slides only one has given positive findings.

The Negri bodies appear included in the nerve cells and occasionally in the matrix. They are round, oval or elongated in shape and consist of a hyaline cytoplasm containing from one to six nuclei studded with chromatin granules. This nuclear proliferation apparently takes place without any corresponding cell division and thus differs from the mitotic changes observed in true cellular multiplication.

The argument advanced in support of the parasitic nature of the bodies is their appearance in nearly every case of natural infection while against this contention are urged the facts that they do not appear in animals killed with a fixed virus, their non-presence in infected virus and their capability of passing through the coarse Berkfeld filters. The parasitic exponents endeavour to refute these facts by saying that Negri bodies are simply the result of a cellular reaction to overcome an invasion by these ultimate forms.

Negri bodies vary in size from $1\ \mu$ to $25\ \mu$ and are usually better developed in cases showing a certain degree of latency or long period of incubation.

In preparing a fixed virus for prophylactic treatment, which is accomplished by serial inoculations from one rabbit to another, these bodies gradually diminish in size until they eventually disappear. When a stage is reached at which the virus obtained gives a typical reaction in rabbits in the same period of time which is usually about 7 or 8 days, the virus is said to be fixed.

In endeavouring to substantiate the specificity of Negri bodies for rabies, we have conducted inoculations from brain material in cases showing positive microscopic evidence as well as from those resulting negatively.

We have examined fifty normal dogs and never in one instance have we been able to demonstrate Negri bodies, while in nearly 97 per cent of cases in which these bodies have been found, the affection has been identified as rabies by typical reactions in experimental animals.

Two species of animals were used for inoculation, viz., guinea-pigs and rabbits. The inoculation of the former was discontinued owing to the unreliable nature of the reaction which in our hands failed to reveal any pathognomonic symptoms enabling one to differentiate this disease from the various digestive disorders and obscure

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maladies to which guinea-pigs are prone and which in many cases may result in death. In a great many instances these animals die without showing any prodromal symptoms to indicate the onset of any pernicious affection. However in animals that have indisputably succumbed to rabies, the microscopic examination of the brains has shown large well-marked Negri bodies, distinct in every detail, thus making an admirable animal for studying their structure.

The incessant chattering of male guinea-pigs described by various writers as being a constant feature in affected individuals, has been wholly lacking in those observed at this laboratory. Inoculations have also been made from an established infective virus in order to corroborate this assertion, but in almost every case, animals apparently well and normal in the evening would be found dead the following morning and when examined microscopically, invariably gave incontestible evidence of having been affected with rabies.

METHODS OF INOCULATION.

Inoculations are practised at the laboratory by the infra-orbital and sub-dural methods.

The procedure in the former consists in the introduction into the infra-orbital foramen by way of the orbital cavity of a small quantity of brain emulsion in a saline solution. The eye is first cocainized and when anaesthesia is complete, a long needle of slender calibre is introduced into the orbital cavity, commencing at the nasal canthus and passing backward behind the eyeball and thus through the above-mentioned foramen into the cranial cavity. This operation is attended with considerable difficulty, and proficiency can only be obtained after repeated injections have been made. Another objection we have to this method, is the inconstant results obtained as compared with the sub-dural injections.

The sub-dural method appears to be the ideal operation and consists in the removal of a small piece of the frontal bone by means of a trephine. This is performed under chloroform anaesthesia and is a painless procedure.

The period of incubation varies considerably in experimental animals, depending upon the virulence of the virus and the hyper-susceptibility of some animals as compared with others. The average period is from fifteen to twenty days, and death is nearly always preceded by characteristic symptoms. Numerous cases have been noted where out of three rabbits inoculated, two succumbed with typical symptoms of rabies within the above-mentioned period, while the remaining animal would either fail to react or else die at the end of three months. Aside from the clinical manifestations and the finding of Negri bodies in these latter reacting animals, subsequent inoculations have been conducted with a brain emulsion of the affected individual and in almost every case rabies has followed.

In those animals failing to react, we have another phenomenon, difficult of explanation. Rabbits surviving primary injections, fail to develop rabies after receiving subsequent large doses from a positive source and undoubtedly possess an active immunity against the disease.

The clinical symptoms in rabbits are characteristic and furnish a valuable means of ascertaining the presence of this dread disease. At the onset of the malady, the appetite while usually impaired in some cases becomes capricious in nature.

Eventually all food is refused, and the animal endeavours to seclude itself in a dark corner of the cage. This may be due to a desire to exclude strong light or an inherent wish to escape observation. Some individuals remain perfectly motionless, while others place their heads against a portion of the cage. This latter condition is undoubtedly the result of a cerebral disturbance, and persists until death relieves the sufferer. In the event of the animal being disturbed, spasmodic tremors seize the affected rabbit, these gradually subsiding until reproduced by some further annoyance. In some cases paralysis of the posterior portion of the body ere death takes place and, in nearly every instance, opisthotonus, affecting the head principally, is present.

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The chief manifestation on which considerable reliance is placed is the spasmodic tremors occasioned when the animal is touched with the wire rod kept for that purpose. Affected rabbits leap high in the cage and seem to lose all power of co-ordination. This state is immediately followed by a condition of passiveness, occasionally accompanied by a harsh grating of the teeth.

In conclusion, I might make allusion to the fact that Nocard and Roux have demonstrated that the virus appears in the saliva about three days before the initial symptoms become noticeable and this knowledge aids materially in determining the danger of infection in individuals who have been bitten. Satisfactory results have also been obtained in animals by the prophylactic anti-rabic treatment. Dr. Nesbitt, of the American Biological Department, Kansas city, recently published a few statistics relative to the treatment of a number of animals which had been bitten by a dog affected with rabies. Of the animals injected, all recovered, while one cow, kept as control died showing typical symptoms.

While the foregoing relative to the treatment of animals exposed to rabies is interesting from the viewpoint of the experimentalist, we do not consider it good practice, as the methods employed in Canada to combat this affection among animals by the Health of Animals Branch are greatly to be preferred.

APPENDIX No. 17.

AVIAN TUBERCULOSIS.

(C. H. Higgins and A. B. Wickware, Biological Laboratory)

The disease known under the synonyms, consumption, tuberculosis, and the great white plague (the latter applying more specifically to the affection as found in human beings) is of such widespread importance as to warrant careful consideration, whether appearing in men or animals.

In preparing an article dealing exclusively with this malady as observed in fowls and birds in general, no presumption is made of bringing to light new disclosures, but rather an endeavour will be made to deal with the affection in a general way, from a pathological as well as economic standpoint, and also to record such of our experiments as have a practical bearing on the prevention and eradication of this disease.

It is only within comparatively recent times, slightly over a decade, that tuberculosis as a disease has been observed among fowls in Canada. The affection had probably existed for many years, but its true nature and significance was not recognized until diseases of poultry commenced to attract the attention of workers in comparative pathology. Even up to the present time, the importance of the conservation of domestic fowls is scarcely realized, and apart from the purely technical considerations of the diseases which they may contract, very little thought has been exercised as to how the fostering of the industry will affect our domestic economy.

The losses from tuberculosis have been large to poultry owners, but there is at present no means of arriving, even approximately, at an accurate estimate. Theoretically, poultry offer one of the best investments for capital, but the losses are so great that the theoretical estimate must be discarded. Once tuberculosis disease makes its appearance in a flock, the aggregate losses are large although a great number of birds do not usually die at one time. The general unthriftiness of the fowls, however, renders them unsuitable for table use; and the non-production of eggs makes the industry very unprofitable as well as discouraging to the poultry owner.

As avian or fowl tuberculosis, viewed from a causative standpoint, is almost identical with the disease as found in human beings and bovines, it is imperative that further research work be conducted in order to establish, if possible, its exact relation as a source of infection for other animals and man.

The matter is more pertinent since Mohler and Washburn, of the United States Bureau of Animal Industry, have reported the transmission of avian tuberculosis to mammals by the direct feeding of diseased organs, and also the infection of guinea-pigs by artificial inoculation with the whites of eggs from affected fowls.

That there is considerable variation in the morphology of the causative organisms found in the different forms of tuberculosis cannot be disputed, but extensive investigations have shown that even these apparently specific characteristics can be altered by artificial cultivation upon various laboratory media and also by growth in the tissues of different animals.

The fact that avian tuberculosis is transmissible to mammals, and the mammalian type communicable to human beings, serves to substantiate the theory that changes may occur in the human host whereby the avian and bovine types of organism may undergo transformation into the human type.

Recent statistics show that the bovine type of organism was present in 90 per cent of cases of cervical adenitis (enlarged glands of the neck) occurring in children in the

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vicinity of Edinburgh, infection probably arising through the consumption of non-pasteurized milk. As these and many other cases of human tuberculosis have been traced to infection through the medium of raw milk it is only natural that one should question the possibility of transmission of this insidious disease through the medium of raw eggs. This assumption does not seem unreasonable in view of the fact that raw eggs form the principal article of diet for invalids and individuals whose natural resistance may be lowered and whose systems are impoverished from any one of a number of causes.

Himmelberger, of the Michigan Agricultural College, has recently succeeded in transmitting avian tuberculosis to a bovine, in which latter he obtained a reaction with avian tuberculin although unable to elicit a response when using the bovine tuberculin.

During investigations conducted at this laboratory throughout the past two years, our attention has been chiefly directed towards the microscopic detection of tubercle bacilli in eggs, the infection of experimental animals with these eggs, and the perfecting of a method of diagnosis whereby latent and incipient cases could be identified.

The possibility of congenital tuberculosis being present in chicks has been given considerable attention but our experiments in this connection have thus far given only negative results. Eggs from tuberculous fowls have been artificially incubated and the chicks immediately transferred to new quarters where special precautions were taken to prevent infection from outside sources. The most careful autopsies, however, failed to reveal lesions of tuberculosis, while cultures from splenic tissues gave negative results.

The demonstration of acid-fast¹ organisms in eggs was also undertaken and in nearly 20 per cent of the latter, bacilli microscopically indistinguishable from tubercle were found to be present. The subsequent inoculation of guinea-pigs with material from these eggs produced a generalized tuberculous infection, from which typical avian cultures were procured.

PREVALENCE.

The prevalence of avian tuberculosis throughout Canada is, every year, becoming more apparent. This is evidenced by the fact that inquiries from widely separated sources are, from time to time, received at the laboratory, concerning this affection. These inquiries usually come from individuals extensively engaged in poultry production, while a few are received from farmers. There appears, however, to be a striking apathy on the part of the latter in regard to the diseases of, and the care in general of poultry, due in no small measure to the false impression that fowls are of small economic importance as compared with other species of the live stock. In the fall of 1913, while on an official inspection trip, one of us had the opportunity of visiting a locality where large numbers of poultry were being lost. On making inquiries, the information was that the farmers in the vicinity had been losing immense numbers of fowls, for which no cause could be assigned. Autopsies on several hens revealed the affection to be tuberculosis and, on one farm, a clinical observation showed several to be suffering from lameness which was apparently tubercular in nature.

SYMPTOMS OF THE DISEASE.

The causative organism or germ of tuberculosis gains entrance to the system, usually with the food, and finding a favourable location grows and extends to the various tissues. This growth of the germ induces symptoms of unthriftiness, and this unthriftiness is followed sooner or later by death. The detection of tuberculosis from the symptoms is not always easy. Some may be observed to be "going light," yet they are seen to be good feeders. If picked up it is found that the flesh has almost entirely

¹ Tubercle bacilli from any source possess the peculiarity of retaining the dye material used for their study in the presence of acid, hence the term acid-fast.

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disappeared from the breast bone, and this should make one suspicious that something is wrong. A yellow or greenish diarrhoea is frequently present in affected birds and, where this is present the type of the disease is most dangerous to the remainder of the flock, as the germs are to be found in the droppings in immense numbers. .

One of the most frequent symptoms seen early in the course of the disease is lameness, a result of the infection involving a joint of the leg. Lameness is mentioned by persons forwarding fowls for diagnosis more frequently than any other symptom where our subsequent examinations have proven the trouble to be due to tuberculosis. So frequently is lameness the principal symptom observed that we are at once suspicious of tuberculosis whenever the symptom is mentioned.

COURSE OF THE DISEASE.

Fowl affected with tuberculosis may die in a few days from the first appearance of symptoms, or they may linger for weeks, gradually becoming more emaciated as the disease progresses, until they die from exhaustion. The progress is largely dependent on the strength of the invading germ and the natural resistance of the bird. Some outbreaks of the disease follow a more rapid course than others; usually, however, the course in an individual extends over weeks, and sometimes months may intervene before death takes place.

POST-MORTEM FINDINGS.

The post-mortem findings in fowl tuberculosis, when considered in relation to the symptoms and general history, are characteristic. The liver is usually the principal organ affected, and there are lesions from the size of a pin point to that of a large pea, which are white or yellow in colour. The larger lesions when cut into give a gritty sensation as the knife passes through them. These lesions are distinct from the liver tissues and may be quite easily separated from the liver itself. In the more acute cases the liver may be greatly enlarged, even to twice its normal size. This enlargement in chronic cases is noticeable. The spleen is usually involved, the lesions having the same characters as mentioned for those in the liver. The enlargement of the spleen is usual, and it may be four times its normal size. The intestines may or may not be involved. When lesions are present we find nodules from the size of a small pea to that of a medium-sized nut. The minute dissection of these usually presents a free opening into the inside of the bowel, and at this point of entrance there is an ulceration. It is through this opening from the nodule on the intestine to the interior of the bowel that the bacilli gain access to and are so easily distributed by the droppings.

Other visceral organs are seldom involved. It is frequently observed that the joints, notably that of either or both hips may be the seat of tubercular ulcerations. Such an ulceration is the cause of lameness during life.

EXPERIMENTS AT THE BIOLOGICAL LABORATORY WITH THIS DISEASE.

We have conducted experiments with a view of determining the possibility of transmitting tuberculosis through the eggs laid by tuberculous fowls. For these transmission experiments we secured a flock of tuberculous fowls, quartered them in special quarters, hatching the eggs in an incubator.

When sufficient eggs had accumulated to fill the small incubator secured for the purpose (one of sixty-egg capacity) the fowls from which they had been obtained were autopsied. Prior to autopsy, however, they were tested with tuberculin prepared from

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an organism of the avian type, with negative results. Negative results also followed the use of a special tuberculin intra-ocularly (dropped in the eye) and intra-dermally (injected into the skin).

Ten of the fowls above referred to were affected with tuberculosis in various stages, while one failed to show lesions. The principal organs affected were the livers and spleens, the other organs did not show lesions, save in one instance. In this hen a chronic tubercular peritonitis had developed, with adhesions. Small pedunculated tuberculous nodules adhered to the outer coat of the intestines. Ascitic fluid was present, and emaciation marked.

The transmission experiments were not of as conclusive a nature as we desired, owing principally to the fact that the incubator which we were using did not give satisfactory results. Nine chicks only were secured from sixty eggs, of which over 80 per cent proved to be fertile. This machine later failed to give satisfactory results with eggs from another source.

Some of the chicks were autopsied at intervals, the last being destroyed when eight months old. In none of these chicks were we able to detect lesions of tuberculosis.

These negative findings, however, do not prove that tuberculosis may not be transmitted in this manner, for, at the autopsy of the fowls providing us with the eggs used in this connection, lesions were present in over 90 per cent, and in no instance were they of special character. At the autopsies we did not find evidence of tuberculosis involving the ovaries or the oviduct.

With these organs involved the probability of the chicks becoming affected would naturally be greater than was the case with the birds above referred to.

DETAILS OF EXPERIMENTS WITH TUBERCULIN.

In an endeavour to test the merits of tuberculin as a practical diagnostic, experiments have been conducted on twelve tuberculous fowls, four birds being used for each test.

A specially prepared avian tuberculin was used for subcutaneous, intradermal and ophthalmic tests.

Experiment No. 1.—Four fowls were used for the subcutaneous test, temperatures being taken every two hours until six had been recorded. At the expiration of this period each hen was injected with two cubic centimetres of avian tuberculin. The recording of temperature was again continued after an interval of eight hours and taken every two hours until twelve readings had been made.

Result.—In none of the four cases under observation was any marked variation of temperature noted.

Experiment No. 2.—Four fowls were each given 1 c.c. of concentrated tuberculin intradermally, the thickened skin of the breast being chosen.

Result.—No evidence of any local or thermic reaction observed.

Experiment No. 3.—Four fowls were used each receiving one drop of concentrated tuberculin in the eye.

Result.—No evidence of an ophthalmic or thermic reaction noted.

It was then decided to conduct a test with a view of ascertaining the possibility of a thermal reaction occurring during the first or second hour following the injection. Similar parallels had been noted by many observers while applying the tuberculin test in cattle and in view of the circumstances tests were conducted after this manner.

The results are tabulated below:—

		HENS.		
Date.	Time.	No. 1.	No. 2.	No. 3.
June 22, 1912	1 p.m.	106 2	106 2	108
	2 "	106 4	106	106 4
	3 "	106	106 2	106
	4 "	106	106 4	106 4
	5 "	105 6	106	106 4
	6 "	105 8	106	105 8
	7 "	105	105 4	105 6
	8 "	105 8	104 6	105 4
	9 "	105	104 8	105
June 23, 1912.....	5 a.m.	106	106	106
	6 "	105 6	106 4	106
	7 "	105 6	106	106
	8 "	105 6	106	106 2
	9 "	105 8	106 2	106
	9 a.m.			
	Injection.			
	9.30 a.m.	106	106 2	105 6
	10.00 "	106	106	105 8
	10.30 "	106	106 2	106
	11.00 "	105 8	106	106 2
	11.30 "	106	106	106 2
	12.00 "	105 4	106 2	106
	12.30 p.m.	105 4	106 4	106 4
	1.00 "	106 2	106 8	106 4
	1.30 "	106 4	106 6	107
	2.00 "	106 2	106 8	106 8
	2.30 "	106 6	107 2	106 8
	3.00 "	107	106 8	107
	3.30 "	107 4	106 6	106 8
	4.00 "	106 4	106 4	107
	4.30 "	106	106 2	106 4
	5.00 "	106 6	106 4	106 4

SPECIES OF BIRDS AFFECTED WITH TUBERCULOSIS.

The affection has also been observed in canaries, lesions having been demonstrated in two birds autopsied by one of us at the Pathological Laboratory of Queens University, during the past winter. These birds were obtained as domestic pets from a dealer in Toronto, and shortly after being received showed clinical manifestations of a respiratory affection, death taking place in the course of a few weeks. Gross lesions were present in nearly every organ, and microscopic examination showed myriads of acid-fast bacilli of the avian type.

We have observed the disease in turkeys in a number of instances. In one instance, when a turkey was affected the history seemed to indicate the possibility of its having been transmitted from a bovine source. We were unable, however, to follow this up and absolutely determine this possibility.

TRANSMISSION OF TUBERCULOSIS FROM BIRDS TO MAN.

As a recorded instance of the danger of transmission of tuberculosis by birds to the human being, the following extract from a lecture by Dr. H. Roger¹, professor of comparative pathology of the Faculty of Medicine, Paris, is very significant:

“ Animals that live in close promiscuity with man frequently contract tuberculosis, and may transmit it. By opposition to the belief of times gone by, the dog is often

¹Am. Vet. Rev., vol. 41, p. 2, European Chronicles.

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suffering with it. It may localize itself in the kidney, giving rise to lesions of softening, and throwing in the urine considerable quantities of bacilli. Again, see the danger of the propagation, which is so much greater that canine tuberculosis is easily overlooked. It is often manifested by productions of neoplastic appearance which resemble more those of cancer than of tuberculosis.

"These home pet animals are yet more dangerous. Those among you who have been in my laboratory have seen a parrot, now dead, which had cutaneous tuberculosis. As is commonly the case, this bird had been infected by her owner who had advanced tuberculosis, and the bacilli of human origin had invaded the skin of the head of the bird and promoted the growth of the warty lesions. In cases of this kind the animal, annoyed by these growths, scratches itself as it can; scabs of the skin get loose. These are particularly rich in virulent bacilli. Their dissemination spread the disease, and the infection is so much more dangerous when passing from the parrot; the pathogenous agent seems to have gained more infectious power. What is the end of the history of this bird? The first owner died. By his will the parrot went to a young woman, healthy and strong. After a few months she began to cough, to lose flesh. Affected with acute tuberculosis she died in less than a year. No one around her had suspected the cause or origin of her disease. Her physician had never suspected it. Having become too homely, no one wanted the bird any more, and he was sent to my laboratory, where, for those who have seen his lesions, a diagnosis will remain evident and easily confirmed by bacteriological examination."

PREVENTION AND TREATMENT.

In the prevention of tuberculosis and other infectious diseases of fowl, sanitary surroundings, with plenty of sunlight and fresh air are requisites of prime importance. In our opinion, these features are best obtained by the use of the modern cotton-front house, a number of types having been described by various poultry authorities. Circular No. 7, prepared by the late Prof. A. G. Gilbert, of the Experimental Farm staff, describes in detail the method of construction and may be obtained on application.

The best means of preventing and treating tuberculosis in fowls is to destroy the entire flock if all have been running together, and to thoroughly cleanse and disinfect the quarters which they have occupied with any good disinfectant, one of which is a 5 per cent solution of crude carbolic acid. This may be made by adding two teacupful of crude carbolic acid to a pail of hot lime wash. This should be applied with a spray pump, brush, or old broom to all parts of the house occupied by the fowl. This method of disinfection is suggested, owing to the fact that in tuberculosis or consumption in fowls, as has already been indicated, the bacilli or germs are found in the droppings in great numbers, and these should be destroyed. This action is further recommended as it has been shown that fowls, dead of tuberculosis, if eaten by hogs communicate the disease to them, and it is probable that the droppings would also communicate the disease in a similar manner.

When destroying the birds after it has been demonstrated that tuberculosis is present, some may be suitable for food if an examination of the livers shows no yellow or white spots from the size of a pin point to that of a pea, and there are no nodules or lumps on the intestines. When these lesions are present the flesh cannot be considered suitable for human food.

We have found that eggs from tuberculous fowls may contain the bacilli or germs in the white, and we, as well as others, have demonstrated that they are in sufficient numbers to infect small experimental animals.

This suggests a possible source through which tuberculosis may be introduced into a flock, namely, by the unsuspecting purchase of eggs from someone who has tuberculosis among his fowl.

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The drastic measures above recommended should be followed in all cases when tuberculosis appears among fowl. These measures, while temporarily entailing a considerable loss, will in the end prove the most economical to the owner and the community.

INSTRUCTIONS FOR SENDING MATERIAL FOR EXAMINATION.

Where it is desired to determine the nature of any condition causing losses among fowl, an examination will be undertaken by the Biological Laboratory, Ottawa, providing suitable material is supplied. If possible, two live but affected birds should be forwarded by express in order that a thorough autopsy may be made. It is not necessary to prepay the express. When the condition has been found at autopsy, the diseased tissues may be sent by mail, if properly packed and preserved. Tissues may be preserved in pure alcohol or a solution of one part of formaldehyde to nine parts of water. After an examination has been made, suggestions will be forwarded for the prevention of further losses.

Specimens sent by express or mail should be addressed to the

Biological Laboratory,

Ottawa, Canada.

Information concerning the losses which have been experienced should be sent with the material in order that it may be properly identified. The name and address of the sender should be written plainly so that the result of the examination may be forwarded with the least possible delay.

APPENDIX No. 18.

ENTERO-HEPATITIS OR BLACK-HEAD IN TURKEYS.

NOTES AND EXPERIMENTS.

(By Chas. H. Higgins, A. B. Wickware and N. M. Guiou, Biological Laboratory.)

There have been undertaken, at this laboratory for the past few seasons, a number of experiments having as their object, the rearing to maturity of turkeys from a flock of infected birds.

The researches into the nature of this malady have been connected with the etiology, diagnosis, treatment and prophylaxis. It is to be borne in mind that what we may offer is intended as a synopsis of our work and observations and not as a full treatise on the disease. As our experiments have been conducted on a small scale, too much dependence cannot be placed upon the interpretation of the reactions or the results obtained.

ETIOLOGY.

At the outset we may state that we accept, in the absence of incontrovertible data, the amœbic theory of the disease, originally reported by Theobald Smith in 1894-5.¹

His findings have supplied us with much valuable data and have proven of great assistance in the conduct of the work. We do not care to enter into a discussion of the theories other than that it is of amœbic origin, as our results in this connection can only be reported when we have completed certain experiments in transmission. These experiments in transmission cannot be undertaken until we have found some means of positively predetermining that the stock on which we are experimenting is free from active or latent infection. At present there is to our knowledge no known means of making such a determination and, therefore, we believe that assertions from any investigator should be withheld until accurate scientific data are available.

We present herewith a résumé of our experiments during the past summer, as we believe that other investigators should have the advantage of the experience gained. At the outset we may point out that we have not lost sight of the possibility of some other factor or factors being connected with the occurrence of this disease.

We are aware that similar lesions to those of entero-hepatitis in turkeys may be found in the livers of fowls whose history is unknown. We have had lesions of entero-hepatitis in the livers of young chicks exposed to infected turkeys. We also know that turkeys showing no outward manifestations of the disease at the time, although severely affected the previous season may possess characteristic lesions in the cæca. From this data it is quite possible that the problem of dealing with entero-hepatitis, having in view the desirability of its complete eradication or prevention, will prove more difficult than has heretofore been considered probable.

We have conducted numerous experiments with amœbæ from the more common sources with a view of familiarizing ourselves with the methods of cultivation. It having been reported by various observers that amœbæ normally exist in the intestines of many animals, plate cultures were made from a variety of sources. Plates were inoculated from the intestines of nine guinea-pigs, and two of these yielded growths of amœbæ. The site from which we took the material was, in most cases, the cæcum. Cultures taken from two frogs which it was expected would be more likely to harbour

¹ U. S. Department of Agriculture.

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amœbæ than any of the other animals, resulted negatively. A few amœbæ were obtained on a plate culture made from the intestine of a toad, while the intestine of an English sparrow yielded amœbæ in abundance. The usual method of inoculating the plates was to smear some of the intestinal contents directly on the surface of the medium. In the case of the sparrow and toad, however, the intestine was removed from the abdomen, slit open along its entire length and left in a Petri dish of dilute alkaline broth for a few days. At the end of that time some of the sediment which had collected on the surface of the broth was transferred to the surface of a solid medium. This method was found to yield satisfactory results. In the case of the turkey, amœbæ have been obtained in abundance on a plate culture made from a liver presenting the characteristic lesions of entero-hepatitis, but we have not secured this positive result in every case, and further observations are necessary before we can be sure that the lesions of entero-hepatitis constantly yield a growth of amœbæ. A plate culture from the diseased cæcum of a turkey affected with entero-hepatitis showed the presence of amœbæ after three months.

On several of the amœbæ plate cultures of animal origin, the presence of actively motile paramœcia was noted, and, in the case of the culture from the cæcum of the turkey affected with entero-hepatitis several other varieties of actively motile protozoa were present.

In addition to these studies of organisms thought to bear some causal relationship to this disease, inoculation experiments with pathological material obtained at autopsy have been carried out to a limited extent on some of the laboratory animals with a hope that some light would be thrown on the etiology of this affection. The experiments performed are listed below, but as many of these have not been repeated, we cannot attempt to draw any general conclusions therefrom. A great advance would be made in the study of the disease could it be communicated to some of the more easily handled laboratory animals.

Experiment 1.—An aqueous emulsion of the black-head liver was prepared.

(a) Some of this was injected per ano into white leghorn hen. Result, died in 36 hours. Post mortem examination, intestine inflamed. (Worms were noted in the cæca, but these have no significant connection with the experiments in question.)

(b) Injected some per ano into hen 24 by means of a soft rubber catheter on end of syringe, no untoward result.

(c) Injected some per ano hen 19, no result.

(d) Injected some into two guinea-pigs, one intra-peritoneal, other subcutaneous, no result. (Used these animals later, see 'Saline Antigen'.)

(e) It being known that amœbæ from liver abscesses in man set up a fatal dysentery when injected into the rectum of a cat, some of this refrigerated emulsion was injected per ano into a cat, no result.

Experiment 2. Made an emulsion of fresh diseased cæcum in warm saline.

(a) Injected some into rectum of cat. Died in seven days, intestine acutely inflamed, with petechial hemorrhages throughout, cæcum greatly involved, and the lumen filled with blood in some places.

(b) Injected some per ano into hen 19, no result.

(c) Injected some into rectum of white mouse, no result.

Experiment 3.—Prepared an emulsion of black-head liver and injected per ano into hen 24, no result.

Together with these animal experiments might be mentioned the following:—

Some blood was drawn from turkey 443, suffering from black-head, and injected intravenously into turkey 317, apparently healthy; no result.

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DIAGNOSIS.

The diagnosis of entero-hepatitis in acute cases presents no difficulty. This loss of muscular tone producing moping with drooped wings and head, the cyanotic appearance and sometimes atrophy of the normally red appendages about the head, and the passing of liquid, yellow, malodorous droppings, produces a clinical picture that cannot be mistaken. In addition to the above mentioned well-marked symptoms, we have noticed in some of the birds a red ring around the anal orifice at the muco-cutaneous junction, and in these birds a distinctly pinkish colouration of the scaly portions of the legs is quite obvious. In young poults the liver lesions may sometimes be seen through the thin abdominal wall. On post-mortem examination, the liver spotted with yellow areas about the size of a 10 cent piece and the greatly enlarged cæca are quite characteristic. The ureters have been observed to be full of yellow pigment, so the origin of the yellow pigment in the droppings is at least partly accounted for. It is reasonable to suppose that the yellow pigment produced in the liver lesions is carried by the blood stream to the kidneys and there eliminated.

The following table appears to indicate that a sub-normal temperature is a feature of the disease:—

Turkey.	Temperature.
293*†	106
443*	106·2
401*	107
317	107·1
461	107·2
347	107·2
251	107·3
402	107·3
31	107·4
449	108·1

*Clinical case of blackhead. †Died of the disease on the following day.

THE SERUM DIAGNOSIS OF ENTERO-HEPATITIS.

Considerable work has been conducted in an endeavour to obtain a method for the serum diagnosis of this disease with the hope that it might be of service in determining the existence of an infection in chronic carriers. We are unable to say at present whether the disease will admit of diagnosis in this manner but a brief summary of what has been done is here given.

Our effort to secure healthy birds a year ago from an outside source may be considered as wholly unsuccessful, for a number were ill on arrival, and subsequently died of the disease. This impressed us with the desirability of securing some means of determining whether or not a given bird was free from infection. We were in possession of such data as the staff of the laboratory had previously secured, and decided that the most promising results would follow experiments in some method of serum diagnosis.

Agglutination tests being out of the question when we are unable to propagate the causative factor of the disease in pure culture, our efforts have been directed chiefly along the line of complement fixation. It is not our purpose in this outline of the season's work to enter into the full details used with the complement fixation test. If the final result of this investigation is favourable, full details will be given in a later report.

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The first difficulty that presented itself in endeavouring to diagnose the disease by this method was the absence of the causative micro-organism from which to prepare our antigen. Accordingly we have endeavoured to obtain an active antigen, using therefor a modification of Wassermann's original reaction for the diagnosis of syphilis, in which the antigen is prepared from a liver rich in spirochaetes.

We find that the best method of obtaining the sample of blood from the turkey is to make a small incision with the point of a sharp scalpel over one of the large veins on the under surface of the wing, the incision running lengthwise of the vein and extending through the skin, superficial fascia, and the wall of the vein. The blood is collected in a flat-bottomed vial. In this way 25 c.c. of blood can be readily obtained from an adult bird. The ordinary method of taking the sample in one of Wright's blood capsules has been found to be unsuitable in the case of the turkey, for owing to the high temperature of the bird, the blood clots almost as soon as drawn and plugs up the small arm of the tube. The serum is drained off the clot and inactivated by heating from 55° to 58° C. for thirty minutes.

The principle of the test depends on the employment of two complement-amboceptor-antigen groups with the same complement common to both. In the first group the amboceptor is the supposed specific antibody in the blood of the affected turkeys, the antigen is supposed to be contained in the saline extract of black-head liver. In the second group the amboceptor is the hæmolysin specific for the goat's erythrocytes (red blood cells) derived from a rabbit injected with these corpuscles. The complement common to both is derived from guinea-pig serum. The union or non-union of the substances in the first group produces no visible change. In the second group, however, the union of these substances produces the phenomenon of hæmolysis (the dissolving of the red blood cells), the presence or absence of which is easily seen. If we now add turkey serum to the antigen of entero-hepatitis in the presence of free complement, and if the serum contains specific amboceptors, the complement, amboceptor, and antigen will unite and the complement will disappear from the solution. If no hæmolytic amboceptor and corpuscles are added no hæmolysis will take place as the complement has been fixed. If, however, the turkey serum does not contain specific amboceptors the complement will not have been fixed and hæmolysis will take place.

Two kinds of antigen were prepared, alcoholic and saline. The alcoholic antigen, prepared from black-head liver in the same way as "syphilitic" antigen is prepared from guinea-pig liver at first gave satisfactory results but subsequently developed hæmolytic properties and had to be discarded. A saline extract of black-head liver was prepared by shaking up the diseased tissue with glass beads for about three days in the shaking machine. It was proved to be non-hæmolytic and 1 c.c. of a 10 per cent solution was found to fix 3 M.H.D. of complement. The guinea-pigs which had already been injected with black-head liver emulsion were given several injections of this saline extract at four-day intervals. At the end of the time the serum of one of these guinea-pigs, when examined for antibodies, gave complement fixation with the saline entero-hepatitis antigen and alcoholic entero-hepatitis antigen but not with alcoholic antigen prepared from guinea-pig liver. Had this experiment resulted negatively it would have shown us that there were no antibodies for our supposed antigen and attempts to get a serum diagnosis would have been useless. The positive result while not by any means proving that there are specific antibodies for our antigen at least allows a possibility for their existence.

An attempt was then made to apply the complement fixation test to several of the laboratory turkeys, some of which were supposed to be chronic carriers of entero-hepatitis infection. The quantity of serum which contains enough amboceptor to combine with the minimum hæmolytic dose of complement varies in different diseases. In syphilis 0.05 c.c. is sufficient, while in glanders 0.1 to 0.2 c.c. are required. It was thought that as the birds at that time did not have the disease in an acute form a large amount

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of serum would have to be used in order to get enough antibodies. Accordingly 1 c.c.¹ was used. The result was that practically every tube showed complement fixation. On consulting the control tubes it was found that the turkey serum alone was fixing the complement. This rendered the estimation of the complement-fixing power of turkey serum necessary. This was accomplished with a mixture of the sera from different turkeys and it was found that 1 c.c. of turkey serum fixed 6 doses of complement.

The next time the test was applied, serum was obtained from a turkey affected with entero-hepatitis, and serum from a young healthy poult was used as a control. The necessary allowance was made for the complement fixing power of the turkey serum and antigen and the result of the test was complete hæmolysis in the case of the young turkey serum with a slight evidence of complement fixation in the tube containing the entero-hepatitis turkey serum. The control tubes showed that the hæmolytic system was working and that none of the substances used fixed all the complement themselves.

It was then thought that the requirements necessary to make the test practical were to ascertain by repeated trials the right strength of antigen and the right quantity of entero-hepatitis turkey serum that would cause a complete suspension of hæmolysis in a positive case. The test has since been conducted with various quantities of antigen and turkey serum, but it has been found that while there is undoubted evidence of complement fixation that the serum control tubes also show a certain amount. This would indicate that the complement fixing power of turkey serum is very considerable, and a large amount of work will yet have to be undertaken to determine whether this is a variable factor in the test before we can say that the disease admits readily of a diagnosis by the method of complement fixation.

Precipitins.—It has been found that entero-hepatitis turkey serum gives a precipitate when added to extracts of diseased liver, but enough work has not been conducted in this connection to enable us to express an opinion as to the specificity of this reaction.

PROPHYLAXIS.

In endeavouring to discover methods which will prevent the spread of this disease, we must first find some measure which will as efficaciously as possible stop the transmission of the disease from parent to offspring, or, from the chronic carrier to the healthy bird. Furthermore, this method must at the same time be of such a nature as to admit of the practical employment by the average farmer.

The ideal to be attained is to have a flock free from disease, start this flock in clean sanitary surroundings, and breed from them without the introduction of new birds which may be chronic carriers of the disease. In our judgment it would be better to raise a flock from the eggs by artificial incubation and brooding.

An attempt has been made to raise a healthy flock from birds that are known to be infected by incubating the eggs and keeping the poults on ground where turkeys had not previously been quartered, and never letting them come in contact with the adult birds. As a control, a small flock of naturally hatched poults were allowed to run with an adult hen turkey which had been a member of the infected flock.

This experiment was unfortunately interfered with by the crows destroying a large number of the incubated poults, but the experiment was still continued. It may be said that no dependence could be placed in the experiment should the isolated turkeys not develop black-head as some farmers' flocks are healthy anyway, but it must be borne in mind that the disease exists in a virulent form in the flock of adult birds at the laboratory so that there is every opportunity for the disease to be transmitted from parent to offspring.

The result of the experiment has been that four poults allowed to run with the adult bird have developed the disease and three deaths have occurred, while as yet

¹ As a matter of fact this part of the test was performed in small tubes, a definite quantity in a nipped capillary pipette being taken as equivalent to 1 c.c.

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no evidence has appeared of its existence in the isolated birds. It must be admitted that the experiment has been necessarily conducted on an exceedingly small scale and that it will have to be repeated several times before we can attempt to draw any conclusions. The fact that at the present time among the adult birds and the poults that have come in contact with them there have been several clinical cases of black-head, and deaths have occurred, while the isolated, artificially incubated birds are free from the disease, gives promise of further investigations into this system of prophylaxis resulting favourably.

TREATMENT.

In searching for a remedial agent for this disease we have endeavoured to investigate some of the substances used in the treatment of protozoan affections. It was first necessary to determine the dose for the turkey and then as cases occurred the effects of these agents were noted.

There is to our knowledge no known specific for controlling the ravages of this affection.

Muriatic acid.—The use of the muriatic acid in the drinking water was found some seven years ago to be followed by beneficial results on affected turkeys which one of us (Higgins) endeavoured to raise. Later it was given a further trial, and three years ago a single turkey at this laboratory made an apparent recovery. During the past four years we have recommended it as being the best medicinal agent which we know to assist in overcoming the affection. A large number of the affected birds have recovered after receiving liberal allowances of this acid.

Some apparently remarkable recoveries have followed the use of this acid, but one cannot hope to bring all affected birds through an attack.

The acid used is a teaspoonful of muriatic acid (Acid Mur. Dil. B.P.) in a quart of drinking water. This acidulated water should be placed in a porcelain or glass vessel and is suggested in the hope that the birds may be carried over an acute attack. At the outset, when the birds show evidence of being severely affected, it may be of advantage to triple the amount of acid (using three teaspoonfuls to the quart of water) for the first three days. This amount will not injure the turkeys and may assist them in more rapidly overcoming the infection.

They should be confined during this period on dry, sanded board floors, in well lighted and well ventilated quarters and allowed access to no other liquid. If allowed to roam they may obtain sufficient water for their requirements from the dew-laden grass or other sources, and, therefore, will not drink the acidulated water. If confined, green food should be supplied in addition to the grain ration.

EMETINE HYDROCHLORIDE.

Acting on the amœbic theory of the disease our attention has been drawn to emetine hydrochloride, which of late has attracted much attention in medical circles. Ipecac has been used for some time in amœbic dysentery, but very recently soluble salts of emetine, its active principle, have been hailed as a specific for this affection, no less efficacious than quinine in malaria and neosalvarsan in spirochaetal infections.

The following experiments were conducted to determine the dose for a turkey:—

Turkey hen 447.—

- August 19.— $\frac{1}{2}$ -grain keratine coated pill emetine hydrochloride.
- " 25.—2 $\frac{1}{2}$ -grain keratine coated pills emetine hydrochloride.
- " 26.—2 $\frac{1}{2}$ -grain keratine coated pills emetine hydrochloride.
- " 27.—2 $\frac{1}{2}$ -grain keratine coated pills emetine hydrochloride.
- " 28.—Dead, post mortem, nothing abnormal.

Gobbler 445.—

- $\frac{1}{2}$ -grain pill for four days, then found dead. Post-mortem, lesions of black-head.

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Turkey hen 317.—

$\frac{1}{4}$ grain for five days, still alive, no serious effects.

Turkey hen 347.—

$\frac{1}{2}$ grain every other day for four doses, still alive, no serious effects.

These experiments show that one-quarter grain a day or one-half grain every other day are safe doses.

Turkeys suffering from the disease were given one-quarter grain pill a day for about a week and showed no improvement. Later the hypodermic injections of this same drug were tried. At first one-sixth grain was given, then one-third grain. After a few injections the birds began to show improvement and the diarrhœa became a less noticeable symptom. They recovered while another turkey which did not receive emetine hypodermically died of the disease. Two poults showing marked clinical evidence of the disease were treated but both died. The lesions in each were found to be very extensive at the autopsy.

Further observations will be necessary before we can draw any conclusion as to the remedial action of emetine hydrochloride in this affection.

ATOXYL.

The use of this arsenical preparation in trypanosomiasis has suggested its use in this supposedly protozoan affection. Up to the present time we have only determined what would be a safe dose for a turkey as we have not had a case to try it on without interfering with our other experiments. It has been found that the hypodermic injection on four successive days of amounts increasing from 1 c. c. to 2 c. c.'s of a 4 per cent solution have not been followed by untoward result.

ACTIVE IMMUNIZATION.

It was thought that the injection of extracts or emulsions of diseased liver might assist in the treatment of the disease by helping to create an active immunity. It has been found, however, that injections of saline extracts have no beneficial effect while the injection of liver emulsion apparently increased the severity of the cases on which it was used, probably by causing a severe anaphylactic reaction.

Provision has been made for the further pursuit of this very important and interesting problem. We anticipate being able to arrive at more tangible conclusions in our projected experiments as a result of the experience already gained. We would point out, however, that in the last report of the Director of the Rhode Island Experiment Station, he states that they seem to have made comparatively little progress in overcoming the ravages of this disease. The work was commenced at the Rhode Island Experiment Station in 1894 by Dr. Theobald Smith and has since been continued under the direction of various investigators. Apart from the very valuable data secured by Theobald Smith there has been very little in the findings from time to time reported from this station, having a bearing on the practical measures to be adopted in overcoming this affection.

CONCLUSIONS.

1. Entero-hepatitis or black-head in turkeys is a disease affecting the liver and cæca (blind guts) caused by the amœba meleagridis, described by Dr. Theobald Smith in 1894-5.

2. Recovery from an attack during the first season may be followed by one or more attacks during that season through which they may or may not pass in safety. Turkeys after one year of age rarely show evidence of the disease, yet on autopsy may present lesions.

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3. Turkeys [as outlined in (2)] may pass through an attack of this affection, after which they are chronic carriers of the infective agent for an indeterminate period.

4. Treatment of affected birds may or may not be effective. Muriatic acid has given good results but is not infallible. It can be used without fear of untoward results. Emetine hydrochloride has been effective in a few instances but is too dangerous for general adoption and can only be used under skilled direction.

5. The hatching and rearing of turkeys by artificial means on uninfected ground and away from other fowl gives promise of a means for overcoming the ravages of this malady.

6. All weak or inferior poults should be destroyed at once and none but the most vigorous individual birds retained for breeding purposes.

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APPENDIX No. 19.

(E. A. Watson, V.S., Pathologist in charge.)

VETERINARY RESEARCH LABORATORY,

LETHBRIDGE, ALTA.

SIR,—I have the honour to submit herewith my report for the year ending March 31, 1914.

THE SERUM TEST FOR DOURINE.

Unquestionably, the serum test for dourine marks a distinct advance in veterinary science and in the control and eradication of a disease ruinous to horsebreeding.

Last year, in the Annual Report, I described methods of serum testing, and expressed the great value and importance of such means of diagnosing dourine, especially in obscure or latent cases—the tolerant, non-clinical carriers—which, while still capable of transmitting the disease show no visible sign of it themselves.

This year's work commenced with the testing of all quarantined, suspected, or dourine contact animals of which the department had knowledge—animals connected for the most part with dourine outbreaks in Saskatchewan and Alberta in which the identity of the disease had already been established by the serum diagnostic method.

By September, 1913, 247 animals had been tested (districts of Milestone, Sask., Unity, Sask., and High River, Alta.) 24 dourine diagnoses resulting. All clinical cases had been destroyed previous to this test. Nevertheless, veterinary inspectors returning to make a final examination and to dispose of the positively reacting animals found that several of these had broken down in health, exhibiting more or less characteristic symptoms and dourine paralyses.

Having disposed of the above the dourine situation appeared more promising than at any time in the history of the disease in Canada, since the first known outbreak in the year 1904, but it was not to be supposed that the disease had been stamped out. The sero-diagnostic method, constituting as it does the only known specific means of detection in incipient cases, had not been sufficiently long in operation to permit of any such conclusion.

It was feared that unknown carriers of dourine, surviving the earlier outbreaks, might start a recurrence or further distribute infection.

In November, 1913, an outbreak of dourine was suspected in southern Alberta, Inspector Gallivan discovering several cases of disease showing conditions common to dourine. Serum tests were immediately made by the complement fixation and agglutination methods, and a diagnosis of dourine established on the positive reactions obtained. Further investigation proved the outbreak to be a more extensive and destructive one than any this department has had to deal with. Infection was found to be widespread over two of the largest horse ranches in southern Alberta, and through the sales and shipments of animals from these ranches, carried to numerous districts and ranches in the provinces of Alberta and Saskatchewan. These outbreaks have involved an immense amount of investigation and control work, and in this connection the laboratory aid afforded by the serum test methods has proven invaluable. The maintenance and expenses of this experimental station and all the research work that has led up to these present methods of testing has indeed been more than offset by the number of tests and diagnoses made in the past six months.

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A final summary of the number of tests made during the year ending March 31, 1914, follows:—

Total number of serum tests for dourine.. . . .	4,015	
Including—		
Complement-Fixation tests.. . . .	3,200	
Agglutination tests.. . . .	730	
Precipitin tests.. . . .	85	
	4,015	4,015
Number of sera giving positive reactions to dourine.. . . .	512	

Accordingly a diagnosis of dourine was made on the 512 animals whose sera gave specific reactions to the test. Evidence of the reliability of these diagnoses has been given in numerous instances by the veterinary inspectors in charge of the field work, who report that in every case where some symptoms were noted at the time blood was drawn and sent to the laboratory, the test report was shown to be positive. Further, that in many cases in which no sign whatever of the disease could be discerned when blood was collected, but in which the serum reaction was also positive, there ensued within two or three months well defined stages of disease, in some cases death taking place before the animals were finally removed for slaughter.

The early diagnosis of this disease is the all-important factor in the work of control; in this lies the great value of the serum test. The specific serum reaction can be ascertained long before any symptomatic evidence of disease is presented. The incubation period of dourine is, however, in some cases, very prolonged, and it appears advisable not to consider a negative reaction as final unless three months have elapsed since the last possible date of infection. Among the sera tested we have found a few to give a weak, partial, or questionable reaction. These are retested after an interval of about two months, and in several cases we have obtained strongly positive reactions at this second test.

It is gratifying to be able to report that horse owners in the dourine-infected districts are expressing their satisfaction with our present methods of diagnosis, and are intelligently co-operating with the officers of this department in the work of stamping out the disease. The fact that, as mentioned above, in numerous instances a serum diagnosis of dourine in an apparently healthy animal has been confirmed by subsequent developments of the disease, together with the fact that all clinical cases also gave a positive serum reaction (in the great majority of cases the tests were made and diagnosis given before any reports were received from the inspector in the field as to the condition of the animal) has served to impress owners with the accuracy of the test. Several of the largest horse owners whose herds we have tested have personally visited the laboratory to see some tests carried out, and have expressed their appreciation of the work the department is doing in the interests of horse breeding. Every week letters are being received and requests made to the inspectors for tests of breeding studs; whereas in past years, it was very difficult matter to obtain information with regard to such animals, and control work was hindered rather than helped by the parties interested.

Arrangements are now being made for the testing of all stallions used for breeding purposes in the dourine-infected districts, and, of course, of any mare that comes under suspicion. In this way the earliest possible knowledge of a fresh infection can be ascertained, and further spread prevented.

We are also proceeding to test the horses on the Peigan and Blood Indian reservations. Already, by the serum test, we know that a number of stallions on these reserves are infected. Compared with the better breeds of horses, the Indian pony breed is very resistant to dourine, easily tolerating an infection. Clinical cases are rare, and the mortality is very light. But there is no doubt that the virus of dourine

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exists and is harboured on these reserves, the conditions being most favourable for its maintenance. Numbers of horses stray on to and off the reserves, and in such manner a channel for the passage of dourine to other districts is easily made.

The serum testing of horses on a very large scale indeed must be undertaken to keep down the disease and stamp it out. The new laboratory which has been running for a year past has made possible a systematic testing of all suspected and dourine-contact animals, but only by untiring and extraordinary efforts have we been able to carry out the large number of tests required.

The work is extremely arduous and necessitates long hours of application and continuous attention to the innumerable but all-important details of technique. With daily practice and experience one becomes expert with these serum test methods which, however, are so delicate and sensitive to a varying technique and changed conditions that only an expert worker should apply them and interpret the results. In inexperienced hands apparent contradictions occur which really are not contradictions at all but are the result of faulty interpretations of the preliminary tests and wrong estimations of the titres and properties of the different re-agents.

Serum test methods for dourine were described in detail in the last annual report in my paper "The Serum Re-actions and Serum Diagnosis of Dourine." These still hold good, but for testing sera on a large scale, in lots of 100 or more at a time, certain modifications have had to be introduced, together with more speedy methods of procedure.

NOTES ON AND PROCEDURE NOW FOLLOWED AND RECOMMENDED IN THE SERUM TEST FOR
DOURINE.

Collecting blood.—To ensure specimens arriving at the laboratory in as sterile a condition as possible, vials, needles and attachments are prepared and sent out as required ready for immediate use, also directions as to the manner of drawing blood and storing. (See directions reprinted herein.) Neither carbolic acid nor any preservative is to be added to the blood. When laboratory vials are used, and the directions followed, the specimens are always received in proper condition for test.

DIRECTIONS IN COLLECTING BLOOD FOR SERUM TEST.

Vials, needles, and attachments are supplied by the laboratory, sterilized and ready for immediate use. Blood should be drawn from the jugular vein. The site is prepared by clipping off the hair and sponging a broad surface with carbolic solution or other disinfectant. Swell the vein by cording the neck fairly tight and nick the skin with a sharp pair of clean scissors. Spread open incision and insert needle into vein and *when blood flows freely* remove cork from vial and *fill to the neck* or within one-half inch or less of the lower surface of the cork.

Do not add carbolic acid or any preservative to specimens.—A vial should be filled quickly with freely flowing blood, not in driplets. When filling, the cork should be protected from dust or contact with unsterilized surface. It may be held within the sterilized wrapper of the vial. The rubber tubing and nozzle are provided so that the flow of blood may be stopped by compressing the tubing when the nozzle is entering and leaving the vial. Immediately after filling the vial write on label identification number, your initials and the date. Then leave to stand upright for fifteen to twenty minutes, or until the clot is formed. If left overnight, keep in a cool place. Forward to the laboratory, together with report on Health of Animals Form 46 and serum test Form 61, the latter in duplicate (copy attached).

Avoid taking blood when animal is in a febrile condition.

When laboratory vials are not available, take any 1-ounce bottle, wash and clean thoroughly, boil in water, drain and dry in a hot oven for one-half to one hour. Corks should be moistened and dried in the oven at same time, and inserted into the bottle while the latter is still hot.

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known normal healthy horses, as well as the sera of two or more known dourine infected horses. The latter or positive control serum should include one strongly positive serum and one weakly positive serum. Altogether, at one and the same time and on the day that the test is to be made, the unknown sera and the control sera are heated in a water bath for one-half hour at a temperature maintained between 58 and 59 degrees Centigrade, inactivation being thus effected and controlled by the strong positive and weak positive sera, as well as by the normal but anticomplementary negative sera.

Antigen.—Antigen for the complement fixation test is most conveniently obtained in the fresh spleens of dourine-infected rats. Dourine strains, however, differ in their antigen-producing properties. A strain that will kill white rats in four days is a better antigen producer than a strain that takes six, eight or more days to kill a rat. As soon as the rat is dead the spleen is removed and kept on ice. The strongest and most suitable antigens are obtained with spleens not more than twenty-four hours old, though two and three days old (kept on ice) spleens can be used. For titration and testing, a spleen is ground up into a fine paste, gradually adding 0.85 per cent salt solution until a fine emulsion is obtained, then filtering out the coarser material. One spleen will furnish 30 to 50 c.c. antigen solution which usually titres out at between 0.15 and 0.30 c.c. in the presence of dourine antibody. Two or three spleens should be titred separately, at one time, against a known dourine serum (positive serum) and a known normal or dourine-free serum (negative serum), and that spleen emulsion which effects complete antibody-antigen combination in the smallest dose selected for the test.

Hæmolytic System.—This consists of:—

Complement: Fresh guinea-pig's serum, not kept over 48 hours

Amboceptor: Anti-sheep rabbit serum, titering at 1:3000 or higher, not less. Good for several months.

Blood Corpuscles: 4 per cent suspension of sheep's blood corpuscles, not kept more than 3 days.

The Complete Test.—This must be commenced as soon as the titres of complement and antigen have been determined and carried out the same day.

When a large number of sera are to be tested, the complete test is best carried out in a double series on two successive days. Thus, in the first series only one tube is used for each serum tested, this tube containing the full or slightly excessive dose of 0.2 c.c. serum. The usual known positive and negative controls are included, and controls for the hæmolytic system. On the results obtained one is enabled to eliminate at once all negative sera, that is all with which there is given complete hæmolysis. On the other hand, any serum which causes slight, partial or complete fixation of complement is recorded as such and subjected to a more complete and exhaustive test on the following day. In this, the second series, the serum is freshly inactivated and a dose of 0.15 c.c. used both for the test proper (with antigen) and for the serum control (without antigen). Further, sera which in the first series may have given partial or questionable reactions are tested in this second series in graduated doses of 0.2 c.c., 0.15 c.c., and 0.1 c.c. At the same time that this second test is being made a fresh batch may, of course, be undergoing the first test.

In this way not only can a much greater number of sera be tested in a given time but there is a great saving in the material used and, of still more importance, every positive and questionable serum is tested twice over with different stock preparations of complement, antigen, and amboceptor, these being freshly prepared every day.

With the above procedure there is usually no difficulty in arriving at an accurate interpretation of the reactions. Should there still remain questionably reacting sera the agglutination test is applied, or the case is held over for a few weeks and fresh serum obtained and retested.

SWAMP-FEVER RESEARCH.

The investigation of swamp-fever continues and many interesting experiments and observations are recorded.

In August, 1913, five horses with a history of swamp-fever were shipped to the laboratory from the Saskatchewan University, Saskatoon. Earlier, in April, a horse in an advanced stage of the disease was received from Lebrett, Sask. These, together with fourteen experimental horses, making twenty swamp-fever subjects in all, have furnished valuable material for study. Unfortunately, it became impossible to give the necessary time to this research or to take advantage of the many opportunities for experiment, on account of having to give practically the whole of my time to the laboratory diagnoses of dourine. Consequently, the investigation has been of a somewhat desultory character and in the chain of evidence being built up there are many missing links. I hope it will be possible for me in the near future to correlate the various facts and observations already noted, and to submit a detailed report for publication.

It may be mentioned now, as of especial interest, that the virus of swamp-fever persists in the blood and body fluids of horses that have survived infection, for more than a year, possibly several years. The blood of four of the naturally infected Saskatchewan horses, these horses appearing in quite normal health, is very infective for healthy horses. In three experimental horses such blood by injection caused typical swamp-fever and death in two to three months. There are thus non-clinical carriers of swamp-fever comparable to the non-clinical carriers of dourine. These carriers are themselves more or less immune, reacting but slightly or not at all to large injections of virulent blood.

Numerous attempts have been made to infect laboratory animals with swamp-fever, but without any success. The horse appears to be the only animal capable of infection, but this of course is uncertain while the nature of the virus and its mode of transmission in nature remain unknown. As a test, the inoculation of animal species other than the equine is useless. There seems to be a possibility of obtaining precipitating sera from hyperimmunized horses, and I am working along this line with the view of arranging a method of serum diagnosis.

During the year the following veterinary inspectors have been detailed for short periods of duty at the laboratory. Inspectors Busselle, W. L. Hawke, Wickware, Munroe, Christie and Hilliard. Inspector W. L. Hawke returned to the laboratory in November, 1913, to assist in the serum diagnosis of dourine, with which he is now an expert worker.

In September, 1913, with the authorization and in the company of the Veterinary Director General I attended the meeting of the American Veterinary Medical Association in New York, the privilege being much appreciated. At this important meeting the control of glanders, hog-cholera, dourine, and contagious abortion was thoroughly inquired into, and many other subjects of interest to this department.

I have the honour to be, sir,

Your obedient servant,

E. A. WATSON,
Pathologist, Veterinary Research Laboratory

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APPENDIX NUMBER 20.

(W. L. Hawke, V.S., Inspector.)

MEDICINE HAT, ALTA., March 31, 1914.

AN OUTBREAK OF DOURINE.

The outbreak of dourine in the Unity district of Saskatchewan, being the first extensive outbreak in that province proved interesting as well as instructive to me in more ways than one.

In the first place, interesting owing to the controversy of opinion expressed at the outset by different inspectors as to the nature of the disease, making it difficult to arrive at a safe diagnosis.

Later in an effort to arrive at some definite conclusion as to the real nature of the disease, the services of Dr. Watson were called in, who, after having obtained specific dourine reactions by serological methods with serum taken from suspected animals, as well as isolating the specific organism of dourine (*trypanosoma equiperdum*) in a suspected animal, proved conclusively the nature of the disease.

Again, from the very mild form of the disease in its early stages as evidenced by the lengthy period of tolerance or resistance in the majority of animals infected—in most cases two to three years. Then, when typical clinical symptoms finally appeared, the infection showed marked virulence and the animals soon broke down completely.

Again, doubly interesting, being as this was the first time in which the serological methods of diagnosis of dourine employed at the Veterinary Research Laboratory, Lethbridge, were made of practical use in dealing with an extensive outbreak in the field.

Having had charge of the field work in connection with this outbreak from date of first quarantine in December, 1911, until last quarantine was raised in July, 1913, I had the opportunity of keeping all suspected animals under close observation. I also assisted with the testing of the serum collected from said animals. So that I was afforded an excellent opportunity of gaining a practical insight into the nature of this insidious disease, as well as of the methods employed in serum diagnosis.

In this outbreak the stud Florus proved an interesting case. The mare which first aroused suspicion as to the existence of some serious disease; which later led to an investigation by the department, together with three or four other mares later found in a similar condition, were all covered only by the above stud some eighteen months previously. The condition of these mares formed the basis on which the early diagnosis was made, and though such symptoms as could be noted were by no means clear or decisive, the infection if it existed, must have been spread by the stud Florus, in the breeding season of 1910, in which one would naturally expect to find evidence of disease, especially after such a lengthy interval. Further, the animal was a pure-bred Belgian horse, and it has been generally experienced that pure-bred animals, especially stallions, do not show any marked resistance to infection, but, on the contrary, show very severely the inroads of disease and the characteristic conditions of dourine. However, at this time said horse remained, one might say, in perfect health, showing no symptoms on which a clinical diagnosis of dourine could have been made, even by the most experienced observer.

The absence of symptoms in this horse is what led to the controversy of opinion in diagnosis at this time.

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The stud still remained in good condition for some time after giving a specific dourine reaction to serum test, until finally typical symptoms of dourine infection appeared, which developed quickly, the animal being destroyed in the spring of 1912, a total wreck.

By July of 1912, eight animals had been destroyed, in four of which clinical symptoms sufficed for diagnosis. The other four were positively diagnosed by the serological methods, but were held over for a period and destroyed when marked dourine symptoms appeared. The contact animals, numbering sixty-seven, were kept in quarantine until the following spring (1913) when a serum test of each was made. Those giving positive reactions were destroyed, and those negative released. Different mares suspected of being diseased on slight symptoms presented at time of taking blood for serum test, gave positive reactions, while others—two in particular—at this time presenting no noticeable symptoms of disease, yet gave specific reactions to the serum test, which two, on my returning to destroy the reactors about six weeks later, presented marked clinical symptoms of dourine.

In no animal whose serum gave a negative reaction were clinical symptoms ever observed. Other animals which had been reported as positive reactors, sooner or later revealed typical dourine conditions. Thus the serum method of diagnosis gave convincing proof of its reliability. Certain mares apparently healthy, clinically, and in good condition, reacted and were destroyed. These no doubt, were more resistant animals and carriers of the disease, and apt to spread infection further. This I consider one of the most important features of the serum test. That is in demonstrating the immune carriers, which I think are more numerous than has been generally suspected, and much more dangerous than a clinical case owing to the fact that the former might be passed as healthy, even after months of close observation and without any negligence on the part of the inspector, and still be capable of transmitting the disease.

The train of symptoms noted in the infected animals throughout the outbreak, in the tolerant stages were very mild, such as slight œdemas in the abdominal and vulvar regions, while the terminal lesions were suggestive of a very virulent infection, nervous lesions predominating, especially of the ears, lips, throat, and larynx, the latter being marked, causing great difficulty in breathing, with a roaring sound. Paralysis of the hind quarters was noted but not marked. No plaques were ever observed.

Two mares enjoyed perfect health until shortly after foaling, when both broke down suddenly, one showing extensive œdema in the region of the vulva and in the mammary gland, as well as ocular lesions. The other presented loss of nerve control.

As to the source of infection in this outbreak, it has not been possible to state definitely where it originated, although every effort was made to do so. This was made more difficult owing to the length of time the disease had been prevalent in the district before being brought to the attention of the department.

In my opinion there are two feasible sources through which infection may have occurred.

First to the fact that a number of horses were brought into this district and sold among the settlers, which horses mostly came from the Medicine Hat district, where dourine had been quite prevalent a few years previously. Among these may have been a latent case of dourine or an immune carrier, which transmitted the infection to the stud Florus.

Again, the stud Florus, being imported in the spring, coming originally from Belgium and being a short while in the United States before coming to Canada, may have contracted the disease in either of the former countries, thus bringing the infection to the Unity district. This being possible, owing to the fact that the horse later proved to be a very resistant animal, or the infection being of a mild form in the early stages, the animal was imported without suspicion.

W. L. ILAWKE

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APPENDIX No. 21.

(*Seymour Hadwen, D. V. Sci., Pathologist in charge Veterinary Research Laboratory, Agassiz, B.C.*).

March 31, 1914.

SIR,—I have the honour to submit to you this my report for the year ending March 31, 1914.

I am pleased to report that this year a distinct advance has been made in the study of bovine hæmaturia. As this laboratory was built primarily for work on this disease, it is natural for me to speak of it first in my report, though several other important investigations have been undertaken during the year.

I desire to record my great appreciation for the assistance of Mr. G. H. Unwin, B.S.A., who has been with me since my return from Europe in October. As an appendix to my report, I attach an article on "Milk Bacteria," written by Mr. Unwin. This work was done early this year, and brings out some practical points in connection with the handling of milk. The addition to the laboratory has facilitated the work very much, as the old quarters were getting much too small. The numbers of specimens sent in for examination have increased. I will only mention a few of those which are of special interest.

In conclusion, I wish to thank you for the great interest you have shown in our work, and of your granting me leave to visit Europe in order to study hæmaturia. I am convinced that journeys of this sort are almost a necessity to men doing research work, especially to those who are cut off from the rest of the world for months at a time.

I have the honour to be, sir,

Your obedient servant,

SEYMOUR HADWEN.

A STUDY OF HÆMATURIA IN FRANCE AND OTHER COUNTRIES.

After reading the different articles on hæmaturia which have been published abroad, I thought that I had only to go to the country the disease was described in to find cases. I had read of the affection occurring in Belgium, but, on reaching Brussels, I was disappointed in learning from the officials at the Royal Veterinary College there that they could not for the moment direct me to any cases, and that the disease only occurred sporadically in Belgium. I journeyed from Brussels to Lille in the north of France and made further inquiries there, but was again disappointed. I wish to record my appreciation for the courtesy and kindness of M. Rivière, Secretary of the Société Veterinaire du Nord, who gave me the addresses of veterinarians in different parts of France, and much other valuable information, which was of great assistance later on.

In Paris, at the Veterinary College of Alfort, I met Professor Moussu who at last gave me the information I wanted. I cannot thank him enough for the trouble he took about me; it was through him that I obtained letters of introduction to veterinarians living in the centre of France, in the departments of the Indre, Creuse, and Correze. Here I found the disease in as bad a form, and as common as it is in British Columbia. The journey from Paris to the centre of France was made by road; this I

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was enabled to do through the courtesy of Dr. E. Hindle, of Cambridge, who brought over his motor from England and accompanied me on the trip. In this way we were able to visit the remote country districts in a manner which would have been impossible by train in so short a time, or so economically. In fact, I may say that I could not have afforded such a lengthy trip but for Dr. Hindle's kind offer.

Much to my surprise, a great deal of the country in these departments has been brought into cultivation only in recent times. The country is hilly, and the land is patchy; in fact, one can say that in many respects it resembles British Columbia. There are good districts and poor ones; it is in the poor ones that hæmaturia is to be found. In some parts of the country I visited, where agricultural conditions were improving, the disease was disappearing; this bears out my contention about the disease in British Columbia.

My first letter of introduction was to M. Rousseau, veterinarian at Le Blanc; this gentleman kindly placed his car at my service, and together we visited a number of farms where there used to be many cases of hæmaturia. M. Rousseau told me that the disease was disappearing in his practice, and that of late he had only about ten cases per annum; it was evident that agricultural conditions were improving rapidly round Le Blanc.

At Argenton, M. Perrot took me to visit a gentleman farmer near there who informed me that he had purchased his farm eighteen years ago; that when he bought it, the land was in very poor tilth, 50 per cent of the animals on it had hæmaturia. Little by little, under improved methods, the disease had diminished, and, for the past six years, there had been no signs of the disease. Phosphate of lime has been put on the fields, ditches have been dug, better stables put up, and the animals have received better care. While examining the cattle on this farm, I captured a female *Ixodes ricinus*. This tick is the carrier of piroplasmosis or tick fever. M. Perrot told me that he had treated animals for this affection on this very farm, and that the two diseases, piroplasmosis and hæmaturia, occurred in his district. He told me that for piroplasmosis he used the Nuttall-Hadwen treatment with Trypanblau and that he found it successful.

The next district I visited was the country around Aigurande (Indre), where M. Lafaye kindly piloted me. On the first farm we went to the owner told us that five of his steers and two cows developed hæmaturia in the space of one year, their ages running between four and seven years. I examined the two cows and found that the symptoms tallied absolutely with those I have found here. On the next little farm we saw four cows which were all affected; this we proved by passing the catheter. The tenant on this farm was in despair, his land was poor and his cows ill, so he talked about leaving the place. M. Lafaye explained his method of diagnosing these urinary affections, which was simplicity itself. He requests his client to bring him a sample of urine, which he puts on one side and allows to settle. In cases of hæmaturia the sediment is blood-red and packed tight; the supernatant liquid looks like ordinary urine. In piroplasmosis (or hæmoglobinuria), the sediment does not settle so well, and the supernatant fluid remains dark. M. Lafaye told me that he had diagnosed hæmaturia and piroplasmosis occurring simultaneously in the same animals. In cases of this sort he treated the animals first with Trypanblau, and, when the fever had subsided, for hæmaturia.

From Aigurande I went to Benevent. M. Fouriaud, the veterinarian there, in common with all other veterinarians I met, treated me with great kindness. It is only in the last eighteen or twenty years that the country round Benevent has been brought into cultivation. Hæmaturia is decreasing as the land gets cleared up and better cultivated. All the veterinarians with whom I spoke agreed that there were more cases of hæmaturia on high land, and fewer along the river bottoms. M. Fouriaud told me that he did not treat cases, as it was so unsatisfactory to himself and to his clients. He said that the universal practice was to keep an animal for a year after

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it began to show symptoms, and then to butcher it. This is quite in accord with my own ideas, for animals rarely die for a year after the symptoms show. The affected animals are sold for beef, but, if they are in poor condition, they go to the packing-houses. One great drawback to the treatment of the affection in France is that cattle are used for work, even the dry milch cows, and this tends to hasten the course of the disease. I have already pointed out that exercise invariably aggravates the malady and causes the bleeding vessels in the bladder to pulsate more rapidly. M. Fouriaud told me that, during the winter months, not a week passes but several affected animals are slaughtered at Benevent.

Besides studying all the cases of hæmaturia I could find, I made notes about the vegetation on the various farms I visited. The uncultivated lands showed a vegetation quite different from that of this province; the only similarity was on cultivated lands. I found most of the cases on badly managed farms. These farms were in need of money being spent on them for drainage, cultivation, and, above all, it seemed to me, for lime to check the acidity of the soil. Much of this land is wet and sour and the grasses and weeds reminded me of places I had seen in British Columbia.

To sum up, my trip was a decided success. I found that hæmaturia, as it exists here, is identical with the French form; that it is very improbable that one special plant causes the trouble, because the vegetation in the two countries differs so much. Finally, the knowledge I gained on this journey helped me greatly, and gave me some of the ideas which were useful later on.

THE NATURE OF THE FOOD CATTLE EAT WHEN WANDERING AT LARGE IN THE FORESTS OF BRITISH COLUMBIA.

When I first began investigating this disease, I was living on a farm at Mount Lehman, B.C. The cattle in this district were housed during the winter months. As soon as the vegetation began to show in the spring, the young animals and dry cows were turned out. They had to subsist entirely on what they could find in the forest. The milk cows were turned out also in the daytime, but were driven home to be milked at night; they were then tied up until morning: these animals were usually given some food to supplement what they got in their daily wanderings. About the earliest plants to come out in the spring are the bleeding-heart (*Dicentra*), and the deer-grass (*Achlys triphylla*): these two plants are eaten with great avidity by cattle; later in the season, I have found it impossible to say exactly what plants or leaves of trees form the main part of their ration. This study is a most puzzling one; I have often followed the cattle for hours to try and find out what they were eating, and finally came to the conclusion that there were hardly any plants or shrubs which came amiss to them. They would snatch a bunch of leaves, then some grass, a bit of skunk cabbage, a few leaves from an alder tree, a willow, or some small plants; in fact, a bit of everything; so I decided that if the vegetation was the cause of hæmaturia, then it was more likely to be a group of plants rather than a single species; if, on the other hand, one plant was the cause of the trouble, it would be possible to find out by a process of elimination. I have made a few preliminary experiments of this sort, which I will now explain.

STUDIES IN PLANTS.

The first experiments were made with the two plants I mention above. Extracts of *Achlys triphylla* were made by boiling, and the extracts injected into rabbits in a most concentrated form; it had about the consistency of treacle; 5 c.c. doses produced no effects.

An extract of *Dicentra*, boiled down to a syrup, was injected into a rabbit and a guinea-pig; they received 4 cc. and 3 cc. respectively. The effects were nil, except for

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causing the animals to become drowsy. I am informed that this plant used to be classed with the *Papaveraceæ*, and is a class relative, which accounts for its soporific effect.

An extract of alder was made by boiling down two hundred grams of the tip of the shoots, including the leaves and the fruit; this extract was concentrated to 50 cc., and 5 cc. were injected into two rabbits. No toxic effects followed these injections.

EXPERIMENTAL FEEDING OF BRACKEN ("PTERIS AQUILINA").

Many farmers hold the view that this plant is the cause of hæmaturia. The theory which is most commonly believed is that the spores, dropping on to the grass, or ripening in the cut hay, are eaten by the cattle. The following experiment really shows that the spores are quite harmless, even in large doses. The only reason I can see for this belief having spread is that hæmaturia is common on land where fern abounds, that this land is invariably ferny until it has been under cultivation for some time. Another proof that bracken is not the cause of hæmaturia is that one finds it growing in many places in this and other countries where the disease does not exist.

PROTOCOL OF EXPERIMENT.

- Day 1. Calf given 10 grams of fern spores in milk.
" 2. Calf given 10 grams of fern spores in milk.
" 3-8. Calf given 20 grams of fern spores daily in milk.
" 9. Calf given 30 grams of fern spores in milk.

A total of 150 grams of fern spores was given. This is a large quantity, as the spores are very light and filled two pint jars.

Day 88. Calf killed. All organs normal.

ARGUMENTS IN FAVOUR OF THE THEORY THAT PLANTS CONTAINING OXALIC ACID ARE THE CAUSE OF HÆMATURIA IN CATTLE.

The cause of hæmaturia has long been looked for in vain; many theories have been advanced and refuted, so that it is natural for me to be conservative in what I am about to say, and in interpreting the results of the experiments I have lately been conducting. Before going any further, I should like to mention the valuable help given to me by Dr. W. E. Dixon, the noted toxicologist of Cambridge University; he it was who helped me to formulate the ideas I now hold on the subject.

These experiments, to my mind, are very encouraging, and my field observations back them up, so that I feel much more satisfied concerning the outlook of controlling hæmaturia than I ever did before. Experiments were undertaken to prove that oxalic acid in plants played an important part in producing hæmaturia in cattle. The experiments were divided under two heads; one the injection of calcium oxalate crystals into the bladder, the other the feeding of oxalic acid by the mouth.

In experimental injections into the bladder of calcium oxalate crystals, the animals evinced great irritation, and, after several injections, made on consecutive days, straining became more marked and finally bloody urine was passed. This proves conclusively that calcium oxalate crystals can wound the walls of the bladder sufficiently to cause hemorrhage. These experiments have been made with four different animals.

Calcium oxalate crystals have been demonstrated in many cases of hæmaturia in this country, and I found them also in a specimen I brought back with me from France. Their numbers are often small, but I have already shown that the disease takes, on an average, six years to develop; thus it is probable that the constant irritation of these crystals, even when present in small numbers, may eventually produce hæmaturia. Nearly all the experimenters who have worked on hæmaturia say that the bladder lesions are undoubtedly the result of prolonged irritation. An interesting point

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which I have not seen mentioned is the fact that the majority of the lesions found in the bladder are in the most dependent parts; this likewise suggests that the irritant falls to the lowest parts of the organ in the same way that calcium oxalate crystals fall to the bottom of a beaker.

The results of feeding oxalic acid by the mouth have not been as satisfactory in producing hæmaturia as the foregoing method of injecting crystals into the bladder. Oxalic acid is toxic for the first few doses, but very soon the animals develop a toleration for the drug and can take very large doses. The effects on the urine are apparent from the first. Albumin is seen, and epithelial cells become numerous after sedimentation. Red blood corpuscles also appear in smaller numbers; in some cases they are in sufficient quantities to be visible to the naked eye. Calcium oxalate crystals are numerous. Three calves and a cow were experimented on. It is a fact that, under natural conditions, young animals under two years of age rarely contract the disease. In my own experience I have never seen such a case, but have heard of one or two at eighteen months. This age limit supports my theory, because young animals which drink milk are not affected. At first they do not take green food at all; later when they begin to do so, the lime which is in the milk would be sufficient to cause the oxalic acid in the plant to be turned into calcium oxalate and eliminate it as such in the fœces. It is possible that the hydrochloric acid which is present in the digestive juices may be strong enough to act on some of the oxalates found in the plants, converting these into oxalic acid. If this is so, the lime would neutralize this effect. No experiments have been made to prove or disprove this point.

In the experiments I have been conducting of giving oxalic acid by the mouth, a large percentage of it must be eliminated in this way; but, when there is too much for the lime in the food to act on, a certain amount of the free acid must be absorbed; hence the crystals are probably formed somewhere in the urinary tract, when the acid comes in contact with the mucous or other fluids which turn it into calcium oxalate. Arguing from this point, one would expect to find that animals which are given oxalic acid would be stunted and not grow like other animals. This is undoubtedly the case; the animals one finds in the red water districts, if born and raised there, are usually under-sized. Experimentally, I have proved this in the case of two young bulls.

In treating cases of hæmaturia, I have found that lime salts, such as calcium chloride, calcium lactate, and ordinary lime, help animals. In several cases I have seen the blood clotting properties raised. These drugs at one time were largely used in cases of hæmophilia, but now are not held in much esteem. It may be that the improvement I noticed was in reality produced by the action of calcium on the oxalic acid, as it is well known that oxalic acid retards the coagulation of blood. Medical men have long known that acid fruits and vegetables are harmful to some people, and there is much literature on the subject.¹ I have heard of cases where the ingestion of rhubarb caused smarting and burning after urination, and occasionally red cells were found on sedimenting the urine. In cases of oxalic acid poisoning in man, hæmaturia has been seen and bleeding along the alimentary tract. During the course of my experiments I have observed the irritating nature of the crystals, and have seen blood-stained saliva coming from the mouth, and bloody fæces. These are the main facts I have learned from my experiment; in the field, my observations also lend support to them. On this very farm, twenty years ago there used to be many cases of hæmaturia. The land was then newly cleared, and I am told that all the fields were very sour; it is now fourteen years since there has been a case. I could mention very many cases of this sort. Hæmaturia is undoubtedly a poor man's disease, and occurs in new districts. I have seen the disease leave a farm in two or three years, notwithstanding the fact that the descendants of the original cattle remained on it. This disappearance followed clearing operations and cultivation. On other

¹ A very complete list of references on Oxaluria may be found in Noordenss' "Metabolism and Practical Medicine," vol. 3, pp. 1053-1054.

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farms, where the disease is more or less permanent, one finds that the cattle are still allowed to roam at large in the woods or in partially cleared lands; but, as soon as the owner keeps his animals under fence, cultivates his land and feeds them better, the disease vanishes.

A curious and very important fact, which is well known to the farmers of this province, is the absence of hæmaturia on the Delta lands at the mouth of the Fraser river. The reason for this is obvious; the land forming this delta came from the uplands of British Columbia, which are of a totally different character; no cases of hæmaturia are to be found on the inland plateaus. I am told by horticulturists that on the delta the wood of the trees resembles that found in the interior of the country, and, certainly from an agricultural point of view, the land is of the very best. There are other river deltas that I know of where one finds an odd case of hæmaturia, but in these cases the source of these rivers was in the coast belt.

One other point I desire to make is that the disease is to be found in many widely separated countries—the Pacific Islands (Case), Australia (Cleland), America, France, Belgium, etc., and in these different countries the vegetation varies tremendously. Plants containing oxalic acid, however, have a world-wide distribution, which bears out my contention that if the vegetation is the cause of hæmaturia, it is not confined to one species of plant.

Many investigators have claimed that hæmaturia was a contagious disease—Detroye, Moussu, Bowhill, and Kalkus.

During the past two years I have experimented on seventeen animals, and have tried to infect them in a variety of ways—by cohabitation, by injecting urine into the bladder, by giving it by the mouth, by the injection under the skin of blood and urine—but without success. From this and other observations in the field, which I have already recorded, I consider the matter settled. I will finish this part of my report by quoting from Moussu's excellent article on the disease. Several references are made to other workers; some of their conclusions are similar to mine, except that they do not go as far. For instance, Pinchon believed its appearance was due to changes in cultivation (clearing), which in 1830 and 1860 completely altered the general appearance of the country. Sinoir had much the same ideas; Boudeaud and Cruzel thought the disease was due to poor feeding. This idea, though quite wrong, owing to the fact that animals may starve to death without showing signs of hæmaturia, backs up my statement that as a rule the diseased animals are poor specimens of their respective breeds. I do not mean that all cases are thin, but they are generally rough animals, receiving little care and attention. In talking over the benefits derived from cultivation, with Mr. Moore, superintendent of this farm, he gave me an idea which I believe is correct. He says that cultivation and reseeded meadows may not check the acidity of the soil, but that it will tend to crowd out the acid plants and that when liming is practised it tends to encourage lime-loving plants, which also displace the acid ones.

In speaking on treatment, Moussu recommends improved farming methods, such as the cultivation of pasture fields, and the application of superphosphate of lime in particular. He says that Boudeaud has seen the disease disappear when these improvements had been put into practice on farms where the disease had been in permanent possession.

PROTOCOL OF EXPERIMENT TO PROVE THAT CALCIUM OXALATE CRYSTALS ARE CAPABLE OF INJURING THE BLADDER AND PRODUCING HÆMATURIA.

A healthy young heifer four months old was selected for the experiment. The amount of crystals injected was the same each time; 20 grams of oxalic acid and 20 grams of calcium chloride were added together in solution. The precipitate was washed free of acid, then sterilized before being injected.

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- | | | |
|-----|--------|--|
| Day | 1. | Injection given. |
| " | 2. | Urine tested with HNO_3 showed presence of albumin, R.B.C., and bacterial contamination. Heifer straining a great deal. Leucorrhoea. |
| " | 3. | Urine showed a trace of albumin, a few R.B.C., and many leucocytes. |
| " | 4. | Heavy crystalline sediment. Large phosphate crystals, and many leucocytes. |
| " | 6. | Urine practically clear, some leucocytes. Injection given. |
| " | 8. | Injection given. Albumin, R.B.C. increasing. |
| " | 9. | Sediment showed red in centrifuge, numerous R.B.C. Injection given. |
| " | 11. | Injection given. |
| " | 12. | Sediment showed red in tube. Injection given. |
| " | 13. | Injection. |
| " | 15. | .1 per cent R.B.C. Heifer shows great irritation. |
| " | 16. | .1 per cent R.B.C. First urine passed this morning about 1 ounce, coagulated firmly. The clot was pale and contained few red cells, showing that serum is being exuded from the raw surface in the bladder. This explains the nature of the pale clots so frequently seen in moribund cases of Haematuria; possibly the serum exuded may vary in amount according to the state of anæmia present in the animals. |
| " | 17. | Urine turbid. Alkaline, .1 per cent R.B.C. Strips of bladder mucosa in urine. |
| " | 19. | Albumin pronounced. Stringy, fibrinous precipitate. |
| " | 20. | Blood increasing. |
| " | 21. | .1 per cent R.B.C. |
| " | 27. | R. B. C. increasing. |
| " | 28. | Urine red. .4 per cent R.B.C. |
| " | 29. | R.B.C. diminishing. |
| " | 33. | R.B.C. increasing. |
| " | 35. | .2 per cent R.B.C. |
| " | 37. | .1 per cent R.B.C. |
| " | 38. | R.B.C. diminishing. Heifer showing emaciation. |
| " | 52. | Blood decreasing. Albumin still marked. |
| " | 53. | Sudden increase in R.B.C. |
| " | 53-60. | R.B.C. present constantly. |
| " | 61. | R.B.C. increase to .3 per cent. |
| " | 72. | R.B.C. had been decreasing. Urine tinged again on this date. |
| " | 82. | Urine tinged pink. Much albumin. |
| " | 83. | Injections given on days 83, 85, 87, 90 and 94. |
| " | 103. | About .1 per cent R.B.C. |
| " | 112. | Injection of crystals. |
| " | 113. | Urine tinged. |
| " | 114. | Injection given. .2 per cent R.B.C. |
| " | 115. | Urine quite red. No percentage obtained. Experiment not yet concluded. |

SUMMARY OF EXPERIMENT.

This experiment clearly shows that calcium oxalate crystals, when injected into the bladder caused desquamation of epithelium and bleeding. It also shows that in between times, when the injections were stopped for a while, the damage done to the bladder was not repaired. Three other animals are being experimented on in precisely the same way, and the results are very similar. An important point which has been brought out in this experiment is the fact that injury to the bladder cells may cause serum to be exuded. In studying naturally infected cases, I have often been struck with the paleness of the clots, which were sometimes nearly white. Some difficulty was experienced at first in the manufacture of crystals. Frequently, an amorphous precipitate was obtained after mixing oxalic acid with calcium chloride. The crystals which were produced at other times varied very much in shape and size, and I am led to believe that certain forms have more cutting edges than others. The effects of the injections were not uniform, on one day there would be intense irritation, and on another no visible effects.

PROTOCOL COW NUMBER 2.

- | | | |
|-----|----|--|
| Day | 1. | Calcium oxalate crystals injected into the bladder. |
| " | 2. | Urine deep yellow. Albumin present, R.B.C., and leucocytes; also epithelial fragments. |
| " | 4. | Crystals injected into bladder. R.B.C. numerous, and leucocytes. |
| " | 5. | Albumin, R.B.C., and leucocytes. |
| " | 6. | R.B.C., and numerous leucocytes; cystitis indicated. |

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Day	7.	R.B.C., and leucocytes, which are decreasing; injection of crystals.
"	8.	Sediment in urine red; R.B.C. very numerous, also leucocytes. Injection of crystals.
"	9.	.6 per cent R.B.C. in urine after centrifuging. Many epithelial cells; later in the day there was .25 per cent R.B.C. in urine.
"	10.	.4 per cent R.B.C. in urine. Large phosphate crystals found in sediment. Leucocytes and epithelium. Later in the day .15 per cent R.B.C. in urine.
"	11.	.1 per cent R.B.C. in urine. Cow ill.
"	12.	.1 per cent R.B.C. in urine. In the morning, cow was very ill and at 2 p.m. was moribund; temperature, 104; cow shot.

POST-MORTEM NOTES.

Death was due to pyemic infection. Pus was found in the internal organs. Evidence of old inflammation causing adhesions of viscera to the diaphragm, probably of traumatic origin. Bladder much congested, the mucous membrane was eroded in places. The hemorrhagic areas were found mostly in the dependent portions of the bladder.

EXPERIMENTS TO DEMONSTRATE THE EFFECTS OF FEEDING
OXALIC ACID.

The calf used in this experiment was a well-grown animal 2 months old on Day 1.

PROTOCOL OF EXPERIMENT.

Day	1.	Urine tested. No albumin, no R.B.C., a few epithelial cells.
"	2.	8 grams of oxalic acid given by the mouth.
"	3.	Urine normal.
"	4.	8 grams of oxalic acid given; albumin test negative.
"	5.	16 grams of oxalic acid given; urine clouded. Dense sediment of large phosphate crystals; albumin negative.
"	6.	Albumin, R.B.C., and calcium oxalate crystals. A few blood casts.
"	8.	Urine clear and apparently normal.
"	9-11.	45 grams of oxalic acid given (15 grams each day). No albumin, no R.B.C., calcium oxalate crystals observed on this date.
"	12.	15 grams of oxalic acid given. A few R.B.C. observed in urine. Large phosphate crystals.
"	13.	Albumin and R.B.C.
"	14.	15 grams of oxalic acid given. Urine acid to litmus. Albumin present, R.B.C., and calcium oxalate.
"	15.	Gave 30 grams of oxalic acid. Urine acid. Albumin, R.B.C., and calcium oxalate crystals.
"	16.	Gave 30 grams oxalic acid. Urine alkaline. No albumin.
"	17.	Gave 45 grams oxalic acid; albumin negative; calcium oxalate crystals numerous.
"	18.	60 grams oxalic acid given. Albumin negative. Calcium oxalate crystals numerous. A few R.B.C.
"	19.	30 grams oxalic acid given. Albumin marked; R.B.C. numerous.
"	20.	30 grams oxalic acid given. Albumin increasing; urine very acid; numerous shadow corpuscles and unaltered R.B.C. Also epithelial cells.
"	21.	30 grams oxalic acid given; slight albumin, few R.B.C. Calf scouring and off its feed.
"	22.	30 grams oxalic acid given. Calf shows symptoms of poisoning, twitching and trembling, weakness and diarrhoea.
"	23.	Drench discontinued; symptoms continue; urine shows heavy sediment; albumin plentiful; oxalate crystals, R.B.C., and leucocytes, also epithelial cells.
"	24.	592 grams of oxalic acid were given in 42 doses.
"	73.	25 grams oxalic acid given.
"	75.	25 grams oxalic acid given. Slight albumin, phosphate crystals.
"	76-81.	25 grams of oxalic acid given daily.
"	82.	25 grams oxalic acid given. Urine red. Calf has difficulty in passing it. .3 per cent R.B.C. Many oxalate crystals and no phosphate.
"	83.	25 grams oxalic acid given. Urine pink. .1 per cent R.B.C., many oxalate crystals, no phosphates.
"	84.	25 grams oxalic acid given on this day and on the succeeding days set down in the experiment. Numerous R.B.C. and oxalate crystals.
"	86.	Urine tinged, numerous R.B.C. Oxalate crystals and epithelial cells.
"	87.	Urine still tinged, R.B.C. plentiful.

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- Day 89. Urine tinged, R.B.C., and oxalate crystals.
 " 91. Albumin. Heavy sediment of phosphate crystals.
 " 99. Albumin slight. Many phosphate crystals.
 " 100. Albumin. A few R.B.C., haemoglobin in urine. Phosphate and oxalate crystals.
 " 101. Albumin, dense sediment of phosphate crystals. Colouring matter in urine.
 " 104. No albumin, phosphate crystals.
 " 105. Albumin, sediment, mostly phosphate crystals.
 " 106. Albumin pronounced. Urine cloudy and dark. R.B.C. numerous.
 " 108. Urine tinged, albumin and R.B.C. present.
 " 109. Albumin heavy, R.B.C. increasing.
 " 110. Urine lighter, albumin, R.B.C., and phosphates.

This experiment has been continued and will be carried on to its conclusion.

One of the points it brings out is the fact that when phosphate crystals are plentiful, albumin and red cells are scarce. It would seem that they are an indication of a reaction on the part of the animal against oxalic acid. Pigmentation of the urine was frequently seen as the experiment progressed.

PROTOCOL OF EXPERIMENT TO ASCERTAIN THE EFFECT OF GIVING MAXIMUM DOSES OF OXALIC ACID.

A well-grown calf of 4 months of age was selected for the experiment.

- Day 1. 10 grams of oxalic acid given in water. Urine normal. No albumin, no R.B.C., some epithelial cells.
 " 2. 10 grams of oxalic acid.
 " 3. 30 grams of oxalic acid. Albumin, R.B.C., some pigmentation of urine. Calf visibly affected by dosing.
 " 5. 50 grams of oxalic acid. Albumin increasing, few R.B.C., calcium oxalate crystals and amorphous precipitate.
 " 6. 60 grams of oxalic acid. Urine alkaline, albumin, a few R.B.C., and crystals.
 " 7. 60 grams of oxalic acid. Albumin heavy.
 " 8. 60 grams of oxalic acid. Albumin heavy. Numerous epithelial cells. Squamous and kidney, a few R.B.C.
 " 9. 90 grams of oxalic acid. Albumin heavy. Numerous epithelial cells.
 " 10. 100 grams of oxalic acid. Albumin, R.B.C., and oxalate crystals.
 " 11. 100 grams of oxalic acid. Albumin, urine pale, slight sediment of pure calcium oxalate crystals. R.B.C.
 " 12. 50 grams oxalic acid. Light coloured urine. Neutral reaction. Albumin, many oxalate crystals, and epithelial cells.
 " 13. 100 grams oxalic acid. Albumin and epithelial cells.
 " 14. 150 grams of oxalic acid. Albumin and epithelial cells. Sediment light. Saliva becomes bloody, calf very ill.
 " 15. 150 grams oxalic acid. Albumin and heavy sediment in urine.
 " 16. 150 grams oxalic acid. Albumin, and heavy sediment, mostly epithelial. Calf died during the night.

POST-MORTEM NOTES.

Ulcers in the mouth and in the œsophagus. The epithelium in the œsophagal gutter was lifted up in places and blood found underneath. The reticulum was ulcerated and there was blood present. Petichial spots were found along the rest of the alimentary tract. A few petichiae were noticed on the heart. The trachea and lungs were normal; the kidneys were congested, otherwise they showed surprisingly little change. The blood vessels in the bladder were congested. There were no clots in the heart and the blood was black and tarry. The blood was slow in coagulating after the carcass was opened; there were a few clots formed but most of the blood remained fluid. Blood taken in a test-tube at 10.30 in the morning had not fully coagulated at 4 p.m.; but set solid before 5.30 p.m. The urine found in the bladder was pigmented, the reaction was acid; there was albumin, many oxalate crystals, and a few R.B.C., also numerous epithelial cells. During the whole of this experiment, the red cells were never very numerous, even when the albumin rose in amount. Oxalic acid crystals were noticed in the beginning, and were always to be

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found in the sediment; the most valuable result of the experiment was that it shows how little the kidneys are affected by the drug, even in fatal doses. This was a point I was desirous of finding out, because in all the post-mortems I have made on natural cases, where the disease had not advanced too far, the kidneys looked healthy, except for the presence of renal calculi; these calculi have been encountered a number of times.

NOTES ON THE OCCURRENCE OF PIGMENTED URINES.

In previous reports, reference has been made to coloured urine, which did not contain red cells, being voided by both healthy and diseased animals. The colour varied from sherry to dark port.

The first time the occurrence was observed was in a young bull; this animal was being dosed with urine from a case of hæmaturia in an attempt to infect him. When the animal was killed later on, there was no evidence of infection. Since that time, pigmented urine has been seen a number of times, particularly in the cases of a heifer and two bulls. The instructions which had been given to the stableman who looked after them were to water them twice a day, but it was discovered that he was only doing it once instead of twice; the animals were being stall-fed and got very little exercise. The attacks invariably followed watering (the water they were given to drink came from a mountain stream, and was very cold). A shivering spell generally occurred sometimes followed by colicky pains. After the animals got warm again, urine was voided. The temperature fell below normal at the time of the chill, and temperatures of 99° F. were recorded. Albumin was found in the urine. When nitric acid was added, a wide colour ring developed at the line of contact of the two fluids. When the urine was shaken up with a few drops of chloroform, the pigment was precipitated.

While conversing with M. Lafaye, at Aigurande in France, I was informed by him that he had seen similar cases. On inquiry, I found that they occurred in stall-fed animals during the winter. He said that the affected animals recovered after a few doses of soda bi-carbonate. In natural cases of hæmaturia, the urine occasionally does not return to its original colour after centrifuging; sometimes this is due to ammoniacal decomposition having set in, but it occurs also at other times. No more cases have been noticed in the experimental animals here since they have received better care, until lately, since the experimental feeding of oxalic acid started.

Possibly, in the case of oxalic acid feeding, the pigment is derived from dissolved red cells, owing to the urine becoming acid. However, in the previous cases the urine was alkaline. These observations are mainly of value from a clinical standpoint, in differentiating between the various diseases which bring about pigmentation of the urine.

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TICK PARALYSIS.

RESULTING FROM THE BITES OF “*DERMACENTOR VENUSTUS*” (BANKS).

For some years past, Dr. Tolmie, Chief Inspector for British Columbia, has been forwarding reports of sheep which were affected with paralysis. This paralysis seemed to recur at about the same period each year. It was thought that the disease might be caused by the animals eating some poisonous plant.

Early in the year, I visited the district from which these reports were coming; it is situated near Keremeos on the international boundary. Full details of this visit and of the subsequent experiments which I conducted at Agassiz on this disease were published in “*Parasitology*,” vol. VI, No. 3, 1913, at the same time a further article was published by Professor Nuttall and myself. I take pleasure in thanking Professor Nuttall for his kindness in placing his laboratory at my disposal for this work.

At this point, I had better explain briefly the nature of this paralytic disease of sheep, and the conclusions arrived at from our experiments. It was evident to me from the first that vegetation was not responsible for the trouble, because the sheep were still feeding on the dry bunch grass, and the spring vegetation had not yet started. On finding numerous ticks upon the sheep, I conceived the idea that possibly they were the cause of the trouble. I captured a number of them and returned to Agassiz, where I placed them on healthy lambs. In a few days, symptoms of paralysis appeared. No bacillus or germ was found in the diseased lambs, nor was it possible to transmit the affection by means of inoculating their blood into healthy animals. On visiting Cambridge in July, in Professor Nuttall's laboratory, we were successful in reproducing the disease in a dog. This was accomplished by placing a single tick on the animal. The tick came from a number which had been collected for me by Mr. Stamford on the mountains near Nelson, B.C.

The most likely theory as to the harmful effect these ticks produced on biting, is that they inject a toxin at a time when they are gorging rapidly; this usually takes place about six days after they attach themselves to an animal. Knowing that the tick is the cause of the trouble, the remedy is simple. The removal of the parasites usually brings about a cure. The disease itself is occasionally fatal, and causes a certain mortality among lambs. Other animals are subject to the attacks of ticks, and, for some time, medical men have suspected them of causing symptoms of paralysis in children.

Since the publication of my article, I have received a paper on this very malady affecting children in Oregon. This was published by Dr. I. U. Temple, of Pendleton, Oregon. He described a number of cases in children. This article, I may say, was published previous to my own, in 1912; the author had not reproduced the disease experimentally. In studying the literature on the subject of the effects of tick bites, I find that cases of paralysis have been seen in other countries, such as Africa and Australia; but I am unaware of any experiments having been done to prove that the tick is the offender. The authors of these articles have simply found ticks on the affected animals and have suspected them of producing the symptoms. During the year, I have gained additional proof of the occurrence and distribution of “Tick paralysis” in British Columbia. For those who are interested in this disease and wish to get further information, I would refer them to the articles which appeared in “*Parasitology*.”

I desire to record my appreciation for the help given me by Mr. R. J. Armstrong, sheep farmer at Chopaka, near Keremeos, who placed animals at my disposal for experimentation.

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OESTRUS OVIS (LINN).

On May 31, seven larvæ were collected from the frontal sinuses of a sheep. Five of these were placed in 80 to 90 per cent alcohol. Much to my surprise, the larvæ still exhibited movements after five and one-half hours' immersion. This is conclusive evidence that alcohol has very little effect on these larvæ.

In a recent number of the Review of Applied Entomology, there is an abstract of an article by Reid. The writer mentions the fact that two larvæ were taken from the nasal cavities of a sheep. Of these one lived for four days in a 2 per cent solution of formalin. Some years ago I tried the effect of formalin upon the larvæ of the house fly, and found that it had very slow killing properties; on the other hand, alcohol seemed to act very rapidly. Therefore, it would appear that the penetrating properties of these liquids vary greatly with different larvæ; and that the larva of *Oestrus ovis* is very resistant to alcohol and formalin. This makes one realize the futility of attempting to remove these parasites by injecting liquids into the nostrils.

From what I have seen, a large number of sheep along the Fraser valley are parasitized by these grubs, a fact which can easily be verified by inspecting the flocks during the spring, when many of the animals will be found to be suffering from catarrh. The only remedial measure which seems likely to give satisfaction would be to provide the sheep with a darkened shed in which they could take refuge during the hot days when the flies are most numerous.

WARBLE FLIES (ADDITIONAL NOTES).

PROTOCOLS OF EXPERIMENT.

The calf used for the experiment was born on September 28, thus excluding the chance of having been attacked by warble flies.

Calf "A."

On December 1, twelve larvæ were extracted from the gullets of two steers. These were carefully removed so as to avoid injury. As each was extracted, it was placed between two folds of the gullet and kept in a warm place. The removal of the larvæ took about half an hour.

An incision was made in the right hind quarter of this calf, and the larvæ were dropped one by one into the pocket. The wound healed rapidly, and no traces of the larvæ were seen until February 2, when four warbles were discovered on the animal's back. All except one were on the right side. Two of these became absorbed later and two remained until after March 10, when they also gradually became absorbed.

Calf 'B.'

On January 25, twenty-six second-stage larvæ were secured as in the preceding experiment, from four different gullets. They were placed in a pocket on the left hind-quarter of a November calf. On February 2 several warbles could be felt on this animal's back. One of them was squeezed out to make sure. Later, eleven of them pierced the skin all along the left side of the back. However, these died subsequently one by one and were absorbed; on March 10 only the punctures which they had made were visible, and all swelling had subsided. (Figs. I and II.)

The object of these experiments was mainly to find out if the second-stage larva, taken from the œsophagus and thus interrupted in its life-cycle, was capable of completing it in another animal. Experiments have been conducted by Koorevaar, who introduced larvæ beneath the skin of dogs and rabbits, and found them fourteen days

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later in various parts of the body, including the spinal canal and the walls of the gullet (quoted by Carpenter). Hence, Koorevaar concluded that the maggots reach the gullet, or spinal canal, after extensive wanderings through the tissues of the ox or calf, and that they do not travel to the gullet by way of the mouth. This theory appears to me to be the most likely, and the experiment with calf "A", given above, helps to support it. In this experiment the larvæ were not seen for a period of eight weeks, when four of them were noticed on the calf's back; and it is certain that they were, during this period, in some unknown part of the animal, possibly in the gullet (?).

In the case of calf 'B,' the larvæ were interrupted in their life-cycle at a later stage, and it may be that they were too far advanced to return to the gullet and not sufficiently mature to migrate to the back. For this reason they did not develop fully. It was noticeable, however, that in calf "A" two of the warbles were larger, and it looked for a time as though these larvæ would reach maturity.

In a recent article by Carpenter and Hewitt, the authors quote Glaser, who states that the newly-hatched larvæ he had under observation, died in one and one-half hours if left in dry air, but that within an hour after hatching they could be revived by transference to water, in which they would live for two days. He concluded, therefore, that they need moisture for their further development, and that they would obtain this in the gullet. Newly-hatched larvæ, placed by him in the shaved skin of an experimental calf, made no attempt to bore through. One young maggot, however, hatched from an egg laid on his trousers by a female *H. lineatum* in June, bored through the skin of his own leg and disappeared in one and three-quarter hours, leaving a small round red spot visible externally. Four or five days later the larva could be felt through the skin, having grown to a length of 2.5 mm. Then it apparently worked its way upwards, for early in September swellings were apparent on the hip and abdomen, and at the end of that month a swelling at the lower end of the gullet was indicated by pain when swallowing. This moved quickly up the gullet, and, on October 2, Glaser had the satisfaction of extracting a warble maggot, 7.5 mm. long, from his own mouth.

"This involuntary experiment tends to show that a warble larva can bore through the skin of the leg and work its way into the gullet in the human subject, and that the insect might pursue the same course in the ox. As mentioned in the introduction to this paper, the experiments with muzzled calves tried during several years at Ballyhaise, show that animals, apparently unable to swallow either the eggs or the young larvæ of hypoderma, are at the most, but partially protected from infection. The strong mouth-hooks and piercer, and the well-developed spiny armature of the newly-hatched maggot, suggest that it could, perhaps, bore as readily through the skin as through the mucous coat of the gullet, and we may eventually find the former to be, after all, the usual mode of entrance."

The quotation just given supports my own ideas on the subject, that the newly-hatched larvæ penetrate the unbroken skin. I have already shown that the egg is laid on the legs of the animal and attached to the base of a hair, next the skin. This has been confirmed by Professor Carpenter. The parts where the eggs are deposited are not easy of access to a cow's tongue and the hair covers the egg completely. Glaser mentions the fact that moisture is necessary to keep the larvæ alive; there are many opportunities for a cow to wet her legs during a summer's day, such as the dew in the morning, or when drinking; and the skin and hair would remain moist for a considerable period. In Glaser's experiment, the larvæ were placed upon an area of shaven skin, but in Carpenter's abstract of his work, no mention is made about supplying moisture. Possibly the failure of the larvæ to bore into the shaven skin may be attributed to the lack of moisture. In any case an experiment such as Glaser describes places the parasites in somewhat abnormal surroundings.

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Several reasons suggest themselves as to why the larvæ select the gullet in which to pass certain stages of their existence. The mucosa is only slightly vascular, and the reaction on the part of the animal against the parasites is inconsiderable. In other organs or tissues, one frequently sees examples of encysted parasites, but I have not yet found an encysted warble larva in the gullet. One reason for this may be that the larvæ are constantly moving, and this fact may also account for their ability to pass through other tissues in their final journey to the back. It is noteworthy that nearly all helminths select either the abdominal cavity and respiratory tract or the skin for their habitat; for instance *Gongylonema scutatum* is found in the walls of the gullet, strongyles in the lungs, bots in the stomach, etc. Possibly the presence of a freer supply of oxygen than could be obtained in the deep tissues may lead them to select these situations, though the food supply may also be an important factor in their choice.

The final position taken by the larvæ is in fibrous tissue, of somewhat the same nature as that found in the mucosa. The reaction of the body against them is manifested by œdematous swellings. Very probably this reaction would end in their destruction, since they have now taken up a fixed position. But shortly after reaching the back, they bore through the skin, and bacteria gain entrance to the cavity in which they lie. Hence, it is my idea that they are helped rather than hindered in maintaining their position. In other words, the tissues have now two foes to cope with instead of one. In summing up, I think the reader will agree that the above experiment lends support to the theory of the larva penetrating the unbroken skin and thus gaining entrance to the body. This theory awaits final proof, and I am recording these observations merely for the purpose of adding my quota to the evidence already gathered.

The next point of interest concerns the position taken by the larva under the hide. While studying the structure of warbles, I have noticed that the opening through the hide is oblique, and that the larva lies with its ventral surface upwards. The caudal end is bent and protrudes through the opening, and this gives one the impression, from an outside view, that it is placed perpendicularly beneath the hide, instead of horizontally as is actually the case. Probably this has already been noticed by other observers, but the point I wish to make is that in the horizontal position the effect of the skin movements is reduced to a minimum. (Figs. III. and IV.).

THE TIME TAKEN FOR THE EMERGENCE OF *HYPODERMA LINEATUM* FROM THE PUPA.

4 larvæ found in stable on 20-3-13, all emerged under sixteen days.

3 larvæ squeezed out on 21-3-13, emerged under fourteen days.

5 larvæ squeezed out on 21-3-13, all emerged under nineteen days.

1 larva found in stable on day of emergence, 22-3-12, hatched in thirteen days.

These larvæ were kept in an incubator with intermittent heat up to 32°C. This shows how the temperature will influence the early or late appearance of Warbleflies in the spring. A large number of larvæ were secured during the spring of 1913; nearly all were of *H. lineatum*, *H. bovis* only appeared later on. It was thought that during the spring of 1914, *H. lineatum* would be plentiful, but the contrary has proved to be the case; most of the larvæ secured so far are of *H. bovis*. Possibly the season may be responsible for this, as the early spring of 1913 was very wet. No specimens of *H. lineatum* were captured out of doors, but *H. bovis* was caught at a later date.

WARBLES.

Fig. 3.—On the left-hand side of the picture an unopened Warble is seen; on the right, a Warble larva; the sac has been partially removed to show its position, which is horizontal to the skin.

Fig. 4.—The same as Fig. 3, except that the Warble on the left has been opened to show the position of the larva.

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FOLLICULAR MANGE IN A COW.

(Demodex bovis, Stiles.)

A large piece of skin was received from Dr. S. A. K. White, of the Provincial Department of Agriculture. He had removed this from a cow condemned for tuberculosis.

According to Neumann, Mr. W. Faxon in 1878 found skins affected with follicular mange in some shipments of hides coming from Illinois and Minnesota. The lesions found in the hides after tanning were extensive, and extended through the whole thickness of the skin. Patton says that *Demodex bovis* causes small tumors which become abscesses. The portion of the hide which I received here was also quite valueless for tanning purposes, the nodules were filled with a cheesy substance containing innumerable mites. However, the nodules showed no signs of turning into abscesses, which was proved by the hair having adapted itself to the shape of the tumor. This can be verified by examining figures. I am unaware of follicular mange in cattle having been recorded in Canada before.—Figs V and VI.

CYSTICERCI FOUND IN SHEEP'S HEARTS.

Several hearts were sent to me by Dr. E. A. Bruce, of Vancouver; these contained calcified cysticercus cysts. In one of them a newly-formed cyst was discovered, and it was thought that probably it was the larval form of *Cysticercus ovis*. The specimen was forwarded to Dr. B. H. Ransom, of the Bureau of Animal Industry at Washington, D.C., who was unable to give a positive opinion. This was owing to the fact that the parasite was damaged. Dr. Bruce is keeping a watch for other specimens, and in case these occur again, further examinations will be made.

QUANTITATIVE BACTERIAL TESTS OF MILK

*By G. H. Unwin, B.S.A.**Assistant Veterinary Research Laboratory, Agassiz, B.C.*

During the months of February, March and April, 1914, a number of bacterial counts were made with the milk of the dairy herd. The object of these tests was two-fold:—

- (1) To ascertain approximately the quantity of bacteria taken up by milk in the process of handling, from the cow to the consumer's bottle.
- (2) To find the relation between the number of bacteria in the air of the barn at milking, and the number in the milk.

METHOD OF HANDLING MILK IN BARN AND DAIRY.

The cows are driven in from pasture or yard an hour or more before milking. The ensilage, grain, and roots are fed, and then some time is allowed to pass before milking is begun. All sweeping and hay-feeding is done afterwards. The men milk in white coats and overalls; and after milking each cow, the hands are washed at a tap and dried with a paper towel which is then thrown away. The udder is wiped with a damp cloth. It might be mentioned here that the cows are usually groomed after the morning milking during the winter months. Closed pails are used, and the milk, after being weighed, is poured into closed cans. It is then taken to the dairy, a distance of about 60 feet, cooled, strained and put into bottles. In the dairy all utensils are washed and scalded after using, and then left exposed to air and sunlight. It will be seen that the methods employed are simple, the object being to produce pure milk by means of care and cleanliness, without the use of an elaborate and expensive outfit.

11 COMPARATIVE TESTS OF MILK FROM UDDER, FROM PAIL, AND FROM COOLER.

METHOD OF QUANTITATIVE TESTING FOR BACTERIA.

Three samples were taken from each cow. The first was drawn from the teat, the second poured from the milk-pail, the third was run through the cooler, strained, and then dipped into the milk bottle. Sterile bottles were used in each case. The milk thus obtained was plated in the following manner:—

From the sample bottle, 1 c.c. of milk was taken with a sterile pipette, and allowed to drop into a bottle containing 200 c.c. of sterile water, where it was well mixed by shaking. Of this dilute mixture, 1 c.c. was drawn out and poured into the Petri dish. The Agar medium was cooled to about 40° C. and poured into the dish, the whole being then mixed and spread over the plate. The plates were then placed in the incubator at 37° C. and left for forty hours. This is a long incubation period, a fact which should be remembered in considering results. Two plates were used with each sample, to check results. It was found that the dilution used (200:1) was convenient, the colonies spreading out well and being easily counted.¹ The following table shows the results of the first series of tests.

TABLE "A".

Date.	No. of cow.	Milk from Teat.	Milk from Pail.	Milk from Cooler.
		Per c. c.	Per c. c.	Per c. c.
February 17.....	19	600	2,400	6,600
" 19.....	24	800	Spreading growth.	3,500
" 20.....	87	600	3,200	6,000
" 23.....	2	3,600	5,400	8,200
" 25.....	3	Sterile.	17,600	30,000
" 26.....	4	10,000	13,000	16,000
" 27.....	30	1,000	4,000	9,000
March 4.....	33	200	3,300	12,000
" 5.....	31	Sterile.	2,700	6,600
" 7.....	25	Sterile.	1,800	5,200
" 9.....	18	400	2,600	6,500
" 10.....	6	800	1,000	4,600
" 15.....	36	600	Spreading growth.	9,000
" 17.....	11	2,000	5,800	20,000
" 18.....	6	3,200	4,200	21,600
Average of counts.		1,587	5,154	10,987

With regard to the first column of figures, it may be observed that, according to Ward (Pure Milk and the Public Health, 1909), the milk drawn directly from the udder is not often sterile. He places the minimum at two hundred and the maximum at nine hundred. Hastings, Hammer and Hoffman, Wisconsin, place the average of milk obtained in this way, at about one thousand per cubic centimetre. In testing the individual cows of the herd they find two apparently healthy cows which give an average count of 38,800 and 37,700 respectively. Comparing these figures with those given above, it will be seen that they coincide; and the findings may therefore be considered quite normal.

Five counts were discarded, it being clear in these cases that accidental contamination had occurred. Thus, on February 24, the milk of No. 29 showed 6,600 per cubic centimetre from the teat, and only 4,000 in each of the samples from pail and cooler. Again, on February 28, No. 13 showed 30,000 in the milk from the teat, and 20,000 in

¹ This is the method followed by W. H. Park, N.Y. (Jour. of Hygiene, July, 1901).

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the milk from the pail. The first sample was obviously contaminated from some other source. Such counts as these, where an error was clearly indicated, were therefore discarded. The average of the fifteen counts tabulated gives:—

Milk taken directly from teat contained.. . . .	1,587 per cc.
“ “ “ pail “	5,154 “
“ “ “ cooler “	10,987 “

Reducing this to a percentage we have the following facts indicated:
Process 1.—Milking.. . . . 224 per cent increase.
Process 2.—Cooling and straining.. . . 113 “ “

The value of these figures is relative. Quantitative tests of bacteria cannot be taken too literally. Yet it will be seen from the table given above that the results are quite uniform and are to be relied upon, as far as they go. They will in any case serve to emphasize the fact that each additional handling of milk greatly increases the risk of contamination, even where clean methods are followed; and consequently, that simplicity and quickness of handling are of prime importance in producing clean milk.

2. THE AIR AS A SOURCE OF CONTAMINATION OF MILK.

This series of tests was carried on during the month of April. The object, as stated above, was to find approximately the relation between the number of bacteria in the air of the barn and the number in the milk. The weather, for the most part, was sunny and dry, and, as would be expected, the counts were slightly higher than in February and March.

For the air test the method originally devised by Koch was followed. Agar plates were exposed to the air during milking. The period of exposure was three minutes; and the plates were placed upon a milking stool, which gave about the height of the milk pail. They were exposed as near to the cow and the milker as possible, in order to reproduce the conditions of milking.

With each air test a corresponding test was made of the milk of the whole herd: the sample was taken from the milk which had been cooled, strained and bottled for the consumer. Check tests were made in every case.

Following are the results in tabulated form:—

DATE.	TIME OF TEST.	AIR CONTENT.	MILK CONTENT.
		(Exposure 3 minutes.) Aver. of 2 plates.	(40 hrs. incubation.) No. per c. c.
April 4.....	5:10 p.m.....	97 (108,86)	29,000
" 6.....	5:10 ".....	69 (78,60)	16,400
" 7.....	5:15 ".....	48 (45,51)	20,000
" 9.....	5:10 ".....	50 (49,51)	13,000
" 11.....	5:5 ".....	99 (94,104)	35,000
" 14.....	5:0 ".....	(¹) 276 (311,241)	80,000
" 15.....	5:10 ".....	70 (76,64)	12,000
" 16.....	5:5 ".....	37 (36,38)	8,000
" 17.....	5:0 ".....	80 (78,81)	22,000
" 21.....	5-20 ".....	(²) 100 (97,104)	5,000
" 22.....	5:5 ".....	58 (51,65)	9,200
" 23.....	5:0 ".....	104 (107,101)	27,000
" 24.....	5:5 ".....	92 (88,96)	38,000

(¹) On this date hay was being chopped in the barn above and the air was full of dust. ,
(²) The air plates were exposed after some of the heifers had been turned out. This may accounes for the high air count, as compared with the milk count.

From the figures it may be seen that the number of bacteria in the air of the barn appears to correspond to a great extent with the number in the milk. Particularly interesting is the test made on April 14, when an abnormal condition of the air existed. Dust-laden air is followed by a correspondingly dirty sample of milk. Excluding this abnormal case, the average of the counts shows:—

Air plate..	75 colonies.
Milk plate..	19550 per c.c.

Seven of the milk samples contained 20,000 or less per cubic centimeter; of these, six showed a corresponding air count of less than 75. The remaining six show over 20,000 in the milk; and all these have an air count of more than 75. Of the thirteen tests one shows a marked variation (April 24). Considering the numerous other sources of contamination which might cause variations, the results are sufficiently uniform to be convincing. The fact that air is a fertile source of milk contamination is, of course, ancient history. The figures taken from these tests are useful only in so far as they magnify the danger of such contamination.

The different organisms observed upon the air plates correspond to many of those found in the milk. Chromogenic forms, green and yellow, were present both in milk and air. A yellow *Staphylococcus*, similar to *St. pyogenes aureus*, was found in both plates. The yellow and white cocci mentioned by Hastings in Research Bulletin 6, Wisconsin Experiment Station, as being very frequently found in the milk of normal healthy cows, were abundant; and a spore-bearing bacillus, forming a spreading, arborescent growth, was common to both. This last corresponds in many respects to *Bacillus mycoides lactis*. Putrefactive, evil-smelling bacteria were found in air and milk.

CONCLUSIONS.

- (1) That quickness and simplicity in methods of handling milk, reduce the risk of contamination.
- (2) That air-borne organisms play a great part in milk contamination, and that especial care should be taken to have the air in barns as free from dust as possible.

APPENDIX No. 22.

PRELIMINARY NOTE ON THE EFFECTS OF FEEDING RICE MEAL TO PIGS.

(P. H. Moore, B.S.A., Superintendent Experimental Farm, Agassiz, B.C.)

In my annual report for the year ending March 31, 1913, some preliminary experiments were described on the value of rice meal as a food for swine.

This work was undertaken in response to numerous inquiries received from this section of the province concerning this food, it being evident that large quantities of rice meal were being sold to farmers. The work done was of a preliminary nature and was necessarily not conclusive; but it indicated that further careful experiment was both desirable and necessary in order to prove: firstly, whether this food was a profitable one for farmers to feed to pigs; and, secondly, what was its effect on animal nutrition.

With these two main objects in view, a number of experiments have been carried on for the past twelve months and the results seem to be sufficiently important to warrant the publishing of a preliminary note.

METHODS USED IN FEEDING.

This year eighty-eight pigs have been put through regular feeding trials, and fifty-two more are still in the pens at different stages of the feeding period. The feeding period lasts one hundred days; the pigs used were as nearly as possible of uniform size, age, and condition; and whenever inequality existed between two pens of pigs, the better animals were fed on rice meal. Each pen contained four pigs.

Rice meal was fed as the main grain ration, supplemented with skim-milk and green food. In most cases two control pens were kept; one of these was fed wheat shorts, the other mixed grain (ground peas, oats, and barley), the supplementary food being the same in quantity and quality as the rice meal pen. Rice meal was also fed in conjunction with other meals and mixtures of meals and controls were kept in every case. Some of the mixtures were as follows:—

Rice meal and shorts.

Rice meal and dried blood.

Rice meal and boiled potatoes.

Rice meal, alfalfa meal, and dried blood.

Rice meal and alfalfa meal.

Control pens on all of these mixtures were fed either wheat shorts or mixed grain. All the pens received equal amounts and quality of green food and a certain number of pens received dried blood in the place of milk. The pigs were kept in clean, dry, well bedded pens with a limited amount of exercise and plenty of fresh air and light; they were all fed three times a day, and were given clean water to drink when they desired it. Two or three times a week they were given liberal quantities of soil, ashes, charcoal and salt.

RESULTS OF FEEDING.

As an illustration of the results arrived at, the protocols of a certain number of pens are given in full:—

PEN "A."—RICE MEAL.

Weight at beginning of period.....	249	pounds.
Weight at end of period	544	"
Dressed weight at end of period.....	398.5	"
Total gain in live weight	295.	"
Average daily gain per pig.....	.737	"
Rice meal consumed for 100 pounds gain.....	376.9	"
Skim milk consumed for 100 pounds gain.....	338.98	"
Green food consumed for 100 pounds gain.....	338.98	"
Cost to produce 100 pounds gain.....	\$6.05	

WEIGHT OF INTERNAL ORGANS.

Pig No.	Weight of Livers.	Weight of Heart and Lungs	Weight of Rest of Viscera.	Weight of Total Viscera
	Lb.	Lb.	Lb.	Lb.
1.....	3.2	2.5	24.5	30.2
2.....	1.5	1.2	10.8	13.5
3.....	2	2.8	14	18.8
4.....	1.7	1 6	8	11.3
Totals.....	8.4	8.1	57.3	73.8

NOTES.—Fifty-three days from the beginning, one pig became lame very suddenly, as if it had a cramp. It was very sore and squealed much; the skin of all the pigs was brown and unhealthy. A few days later, two other pigs went very lame, and another (No. 1) only slightly so. They all remained in this condition until the end of the trial; some days they were slightly better and other days they were very bad.

PEN "B."—WHEAT SHORTS.

Weight at beginning of period	322	pounds.
Weight at end of period	647	"
Dressed weight at end of period	472	"
Total gain in live weight	325	"
Average daily gain per pig	1.04	"
Shorts (wheat) consumed for 100 pounds gain.....	214.15	"
Skim milk consumed for 100 pounds gain.....	240	"
Green food consumed for 100 pounds gain.....	480	"
Cost to produce 100 pounds gain.....	\$4.10	

WEIGHT OF INTERNAL ORGANS.

Pig No.	Weight of Livers.	Weight of Heart and Lungs.	Weight of Rest of Viscera	Weight of Total Viscera.
	Lb.	Lb.	Lb.	Lb.
1.....	3.3	1.9	11.7	16.9
2.....	3.3	2.1	12.3	17.7
3.....	3.4	2.1	16.1	21.6
4.....	2.6	2.1	15.9	20.6
Totals ..	12.6	8.2	56	76.8

NOTES.—All pigs remained healthy throughout the entire feeding period, and never missed a meal. The hair and skin was always in excellent condition. When dressed, the pork was firm and of excellent quality.

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PEN "C."—RICE MEAL AND BOILED POTATOES.

Weight at beginning of period	237	pounds.
Weight at end of period.....	471	"
Dressed weight at end of period (2 best pigs).....	180	"
Total gain in live weight	234.	"
Average daily gain per pig..	585	"
Rice meal consumed for 100 pounds gain.....	364.5	"
Boiled potatoes consumed for 100 pounds gain.....	337.6	"
Skim milk consumed for 100 pounds gain.....	427.3	"
Green food consumed for 100 pounds gain.....	427.3	"
Cost to produce 100 pounds gain.....	\$6.75	

WEIGHT OF INTERNAL ORGANS.

Pig No.	Weight of Livers.	Weight of Heart and Lungs.	Weight of rest of Viscera.	Weight of Total Viscera.
	Lbs.	Lbs.	Lbs.	Lbs.
1.....	2.9	1.9	16.1	20.9
2.....	1.7	1.2	13.5	16.4
Totals.....	4.6	3.1	29.6	37.3

NOTES.—At the end of the period, two pigs were kept for veterinary examination, and, although weights of the viscera were obtained, they are not comparable with these or other figures, hence they are withheld. Thirty-four days after the beginning of the period, all of the pigs refused food and became very lame. Their skins were rough and dark-coloured. Pigs 2, 3, and 4 got very sore and noisy when disturbed; pig No. 1 had intermittent attacks. At times they took violent fits of cramps, characterized by much squealing. Only one pig could stand at the end of the period. Pig No. 3 died in 130 days from beginning of period.

PEN "D."—MIXED GRAIN.

Weight at beginning of period.....	248	pounds.
Weight at end of period.....	638	"
Dressed weight at end of period.....	476	"
Total gain in live weight	390.	"
Average daily gain per pig	1.09	"
Mixed grain consumed for 100 pounds gain.....	229.2	"
Skim milk consumed for 100 pounds gain.....	235.8	"
Green food consumed for 100 pounds gain.....	233.33	"
Cost to produce 100 pounds gain	\$3.92	

WEIGHT OF INTERNAL ORGANS.

Pig No.	Weight of Livers.	Weight of Heart and Lungs.	Weight of rest of Viscera.	Weight of Total Viscera.
	Lbs.	Lbs.	Lbs.	Lbs.
1.....	3.	2.7	19.2	24.9
2.....	3.1	2.5	17.1	22.7
3.....	2.9	2.6	17.	22.5
4.....	3.	2.5	18.1	23.6
Totals.....	12	10.3	71.4	93.7

NOTES.—Pigs were all in excellent condition from beginning to end of trial; when butchered, they were smooth and clean, giving an excellent quality of pork.

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The foregoing tables deal with the question of profit, when we come to that of nutrition, some particularly interesting facts are forthcoming. It was noticed that pigs getting rice meal, after a period of from thirty-eight to sixty days, began to stiffen up and lose appetite. The hair grew long and the skin became unhealthy looking.¹ The muscles became affected, which was indicated by great stiffness and pain. The animals squealed when touched or handled. They preferred to lie buried in the straw, and lost their activity.² None of the controls showed any of these symptoms; consequently the rice meal was undoubtedly the cause of the trouble, no disease of a like nature having appeared among the other pigs on the Experimental Farm. It is probable that this lack of nutrition in the pig is due either to some toxic quality in rice meal or else to the fact that some necessary element is wanting for complete bone formation. The exact chemical nature of this food is being determined by F. T. Shutt, Dominion Chemist, Central Experimental Farm, Ottawa, who is also analysing bones from healthy and from diseased pigs. Until further experiments have been done, it is impossible to say just which of these theories is correct.

At the expiration of the feeding period, the hogs were slaughtered and the weights and general condition carefully noted. It was observed that in all pigs fed on rice meal, the flesh was softer, and the fat did not set as well as in the controls. Also the animals were in every case narrower across the loin, and their skin was rough and hard.

“NOTES ON THE PATHOLOGY AND SYMPTOMS OF RICE-MEAL FED PIGS.”

Dr. S. Hadwen, Pathologist, Veterinary Research Laboratory, Agassiz.

“In the majority of the rice-meal pigs examined no very pronounced lesions were discovered, owing to the fact that the hundred-day feeding period was too short for the lesions to develop fully. The duodenum and stomach were bile-stained, and showed a marked catarrhal condition. In two more advanced cases the condition had progressed further, and in one of these peptic ulcers were found. These lesions are usually indicative of malnutrition, which was further borne out by the fact that the bones could be cut with an ordinary knife. Even the shank-bones could be broken with ordinary strength, or severed with a knife.

“The symptoms bear a striking resemblance to the descriptions of beri-beri in man. It is well known that rice eating is a strong factor in the production of this disease. It can also be produced experimentally in chickens by feeding rice, when it is called *polyneuritis gallinarum*. Besides the lesions described above, other symptoms lend support to this resemblance. The pigs show dilation of the right heart, leading to distressed breathing and cardiac attacks, during which the eye-balls protrude in a peculiar manner.” There is a condition of the nerves leading to sudden painful lameness, generally of the hind-legs, which tends to become chronic. The pigs are extremely sensitive to the touch, and prefer to lie still rather than move about and feed. In the later stages of the malady they are a pitiful sight, though emaciation is not a marked symptom; this is probably because there is no fever during the whole course of the disease.

“Mr. Moore is continuing the work with pigs, and is also conducting some feeding experiments with fowls, with the object of confirming these results. The experiments of Funk, Vedder, and others have clearly proved that certain rice products will cause this affection in poultry. Further information concerning this important disease will be forthcoming later, as a number of pigs are still under experiment. All the pigs slaughtered were carefully examined and when found to be poorly nourished, were condemned.”

¹ Plate 1, fig. 1.

² Plate 2, fig. 4.

³ Plate 1, fig. 2.

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SUMMARY.

From an economic point of view, the interests involved fully justify the expense and trouble which the investigation has entailed. All of the pens fed on rice meal as the main grain ration showed a higher cost to produce a hundred pounds of gain than did their controls.

The average cost of one hundred pounds of gain and the amount of meal used to produce one hundred pounds of gain from all the pens fed in the main experiment are as follows:—

Average cost to produce 100 pounds gain, all rice meal pens..	\$6 15
Average cost to produce 100 pounds gain, all wheat shorts pens.	4 40
Average cost to produce 100 pounds gain, all mixed grain pens.	4 62

The average amount of rice meal to produce one hundred pounds of gain is 363.31 pounds; the average amount of wheat shorts to produce one hundred pounds of gain is 261 pounds; and the average amount of mixed grain to produce one hundred pounds of gain is 281.65 pounds.

These figures show conclusively that rice meal is not as profitable a food for swine as wheat shorts or mixed grain, even when bought at a cheaper price per ton.

In the experiments where rice meal was combined with other foods, the same result was obtained, namely; in every case where rice meal was fed, the cost of production was higher and the gains correspondingly lower.

There appears to be, however, another even more serious argument against feeding rice meal. Troubles indicative of malnutrition have invariably followed its use, and, although this phase of the situation requires further study the results given here are none the less important, though they belong rather to the realm of veterinary examination. These troubles have been noticed by other feeders throughout the province, but have always been ascribed to different causes. Their importance, then, from a feeder's standpoint, must be obvious to all.

In conclusion, I wish to acknowledge the support and assistance of Mr. J. H. Grisdale, B. Agr., Director of Experimental Farms, and to thank the farmers throughout the province for their interest and help in the work.

APPENDIX No. 23.

(*L. L. Cooke, Chief Car and Yard Inspector.*)

OTTAWA, March 31, 1914.

SIR,—I beg to submit herewith my report for the year ending March 31, 1914.

My duties during the major portion of the period were confined to the various livestock markets, as well as to the railway and other stock yards, stables and stock cars used for the public accommodation of animals, either in transit or when offered for sale.

The progress in this work has been gradual, but sure, and at the present time it is somewhat difficult to find a railway or other stock yard which is not in a clean, comfortable and sanitary condition. The same is true of the stables owned by the railway and stock car companies at the principal shipping points and at every large public stable in which horses or other live stock are held for sale or shipment.

Particular attention has been paid to all the large feeding stables at the different distilleries where a great number of cattle are fed during the winter months. A marked improvement has been made with regard to all stock cars used for conveying live stock. They are cleansed and disinfected by the various railway companies, under the supervision of car inspectors at all the principal division points, and it is somewhat difficult to find a dirty stock car on any of the railway lines returning to the various branch lines to-day.

We have two inspectors at Montreal who have supervised the cleansing and disinfecting of 13,819 stock cars during the year, two inspectors at Toronto who have supervised the cleansing and disinfecting of 27,192 stock cars during the year, and one inspector at Niagara Falls who has supervised the cleansing and disinfecting of 9,797 stock cars.

Also, there have been 6,782 stock cars gone through under sealed manifest from one point in the United States to another point in the United States. There have been cleansed and disinfected at Bridgeburg, under Veterinary Inspector Philips' supervision, 5,114 stock cars, and 2,500 went through in bond, sealed and manifested on United States, according to Ministerial Order 33, Section 3. At St. John there have been cleansed and disinfected, under the supervision of the caretaker of the quarantine barn, 185 cars during the year. At Halifax there have been cleansed and disinfected, under the supervision of the veterinary inspector, 449 stock cars during the year.

I have personally supervised the cleansing and disinfecting of a great number of stock cars at Carleton Place, especially those conveying hogs from the western provinces to Hull and then transferring to Carleton Place to be cleansed and disinfected.

I have also kept in close touch with all the boundary points where stock cars are transferred from one railway to another and have enforced Ministerial Order 33, Section 3, which is that all stock cars, whether of Canadian origin or not, and whether empty or conveying merchandise other than live stock, entering Canada from the United States must, if not already showing evidence of having been so treated, be thoroughly cleansed and disinfected to the satisfaction of an inspector of this department, otherwise they will be returned to the United States.

I have paid a good deal of attention to the quarantine stations along the boundary to see that they were kept clean and in good sanitary condition and properly cleansed and disinfected at different times of the year.

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I have also arranged with the Grand Trunk officials at Bridgeburg for the erection of a new cleansing and disinfecting yard, as the old one has, of recent years, been altogether inadequate. The new yard is large and built according to the specifications laid down by this department. It is 2,000 feet long by 200 feet wide, and has two tracks for cars, with a disinfecting track in the centre, and is supplied with water and all the best equipment. There is an 8-foot board fence, battened on the outside, surrounding the yard, and a barb wire on top to keep unauthorized persons out. Stock cars that arrive from Buffalo and other points are cleansed and disinfected in this yard, and the manure is stored there and not allowed to be removed for a period of three months.

There have also been small pens erected at Richmond, Waterloo, Bryson, Mitchell, and several other small places on the various railways. At the Union stock yards, Toronto, there have been 120 additional pens added throughout the year, reducing the larger pens to smaller ones to suit the trend of business. Brick pavements have been laid throughout the entire yard, alleyways and unloading pens, using 800,000 bricks.

This yard is worthy of special mention, as I consider it one of the best, if not the best, we have in Canada to-day. Its capacity is 7,000 cattle per day, 4,000 hogs and 4,000 sheep. There are 184 concrete cattle pens, covering 4 acres; 154 concrete sheep pens, covering 2 acres; 85 concrete hog pens, covering 2 acres; 406 frame cattle pens, covering $8\frac{1}{2}$ acres; 27 G.T.R. unloading chutes, covering $1\frac{1}{2}$ acres; 22 double C.P.R. chutes, covering 1 acre. The tie-up barn holds 240 head; testing barn, 40 head; and dehorning plant, 60 head per hour; stabling accommodation for horses, 158 head. The area of this stock yard is 30 acres.

The disinfecting yard belonging to the Michigan Central Railway, at Montrose, has undergone some minor repairs and is kept in splendid condition. The manure from stock cars is stored for a period of three months before being removed, to prevent any chance of spreading disease. This yard is also used for the cleansing and disinfecting of stock cars.

I have investigated several complaints that have been made by the Humane Society from time to time, but have never found any grounds for such. I have also spent some little time in enforcing the Meat and Canned Foods Act and the regulations made thereunder. Three inspectors are stationed at Windsor to enforce Ministerial Order No. 33, Section 5. Any cars containing hogs showing evidence of disease, and any cars which are dirty or which do not, in the opinion of the inspectors, meet in every way the requirements of the regulations of this department are immediately returned to the United States.

Under this section, 11,672 cars have been inspected and 63 returned to the United States by our inspectors. At Sarnia there have been inspected by the inspector 11,890 cars, and 106 which did not comply with Ministerial Order 33, Section 5, returned to Port Huron.

In conclusion, I would like to state that the different inspectors stationed at the divisional points where stock cars have been cleansed and disinfected have enforced Ministerial Order 37, and the officers in this division have had the co-operation of the different railways in this work.

I have the honour to be, sir,

Your obedient servant,

L. L. COOKE,

Chief Inspector Live Stock Cars and Yards.

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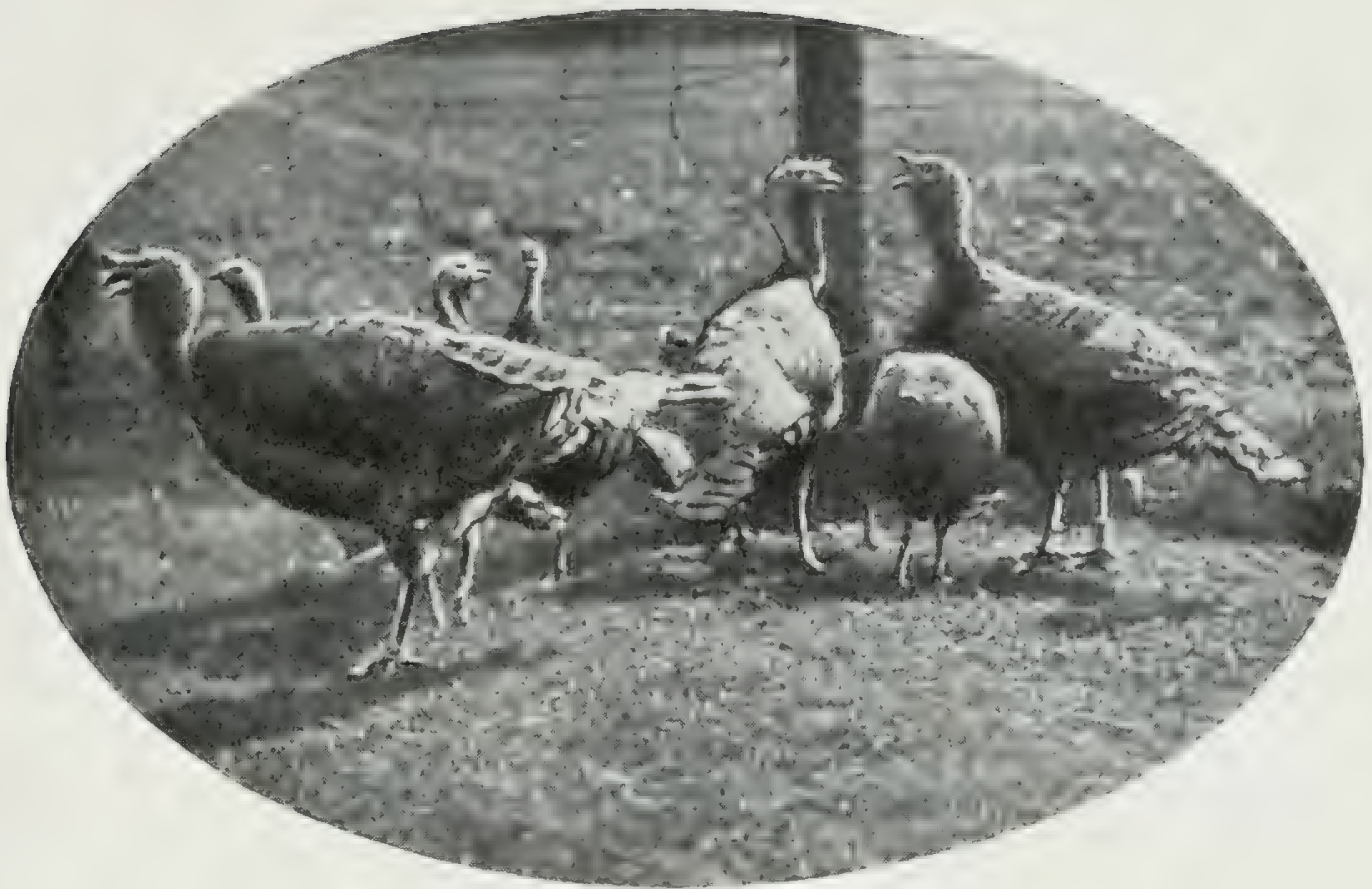


Fig. 1. A group of adult turkeys apparently healthy but in reality chronic carriers of the entero-hepatitis or black-head parasite. Such is the condition of the average flock in which the affection has appeared. Young poults allowed to run with these birds nearly all died of black-head, the usual experience.



Fig. 2. A flock of artificially incubated and brooded poults roaming in their isolated plot.

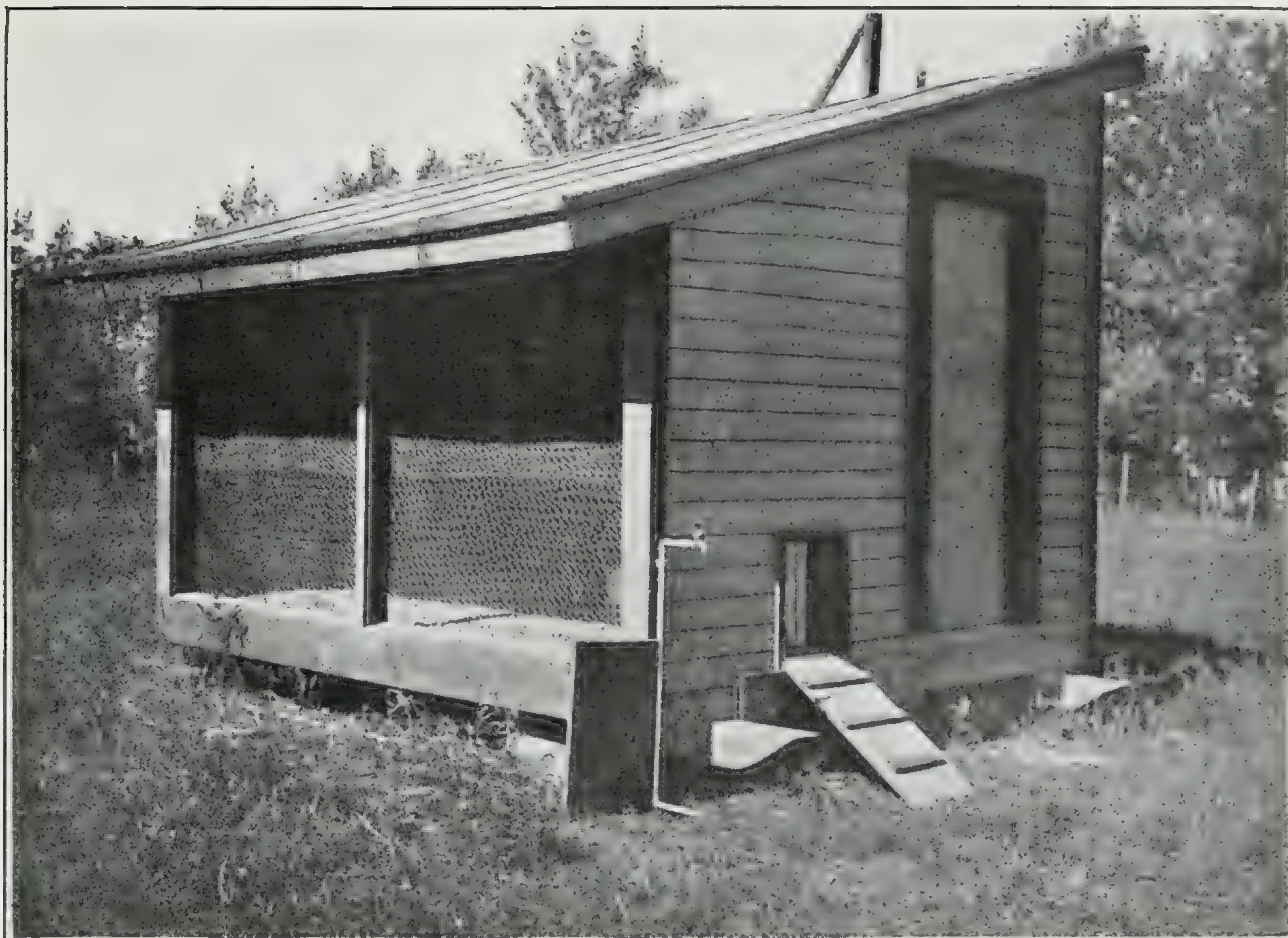


Fig. 1. Turkey shelter used for experimental work at the Biological Laboratory.



Fig. 2. Turkey shelter showing covered runway used for young poults at the Biological Laboratory.

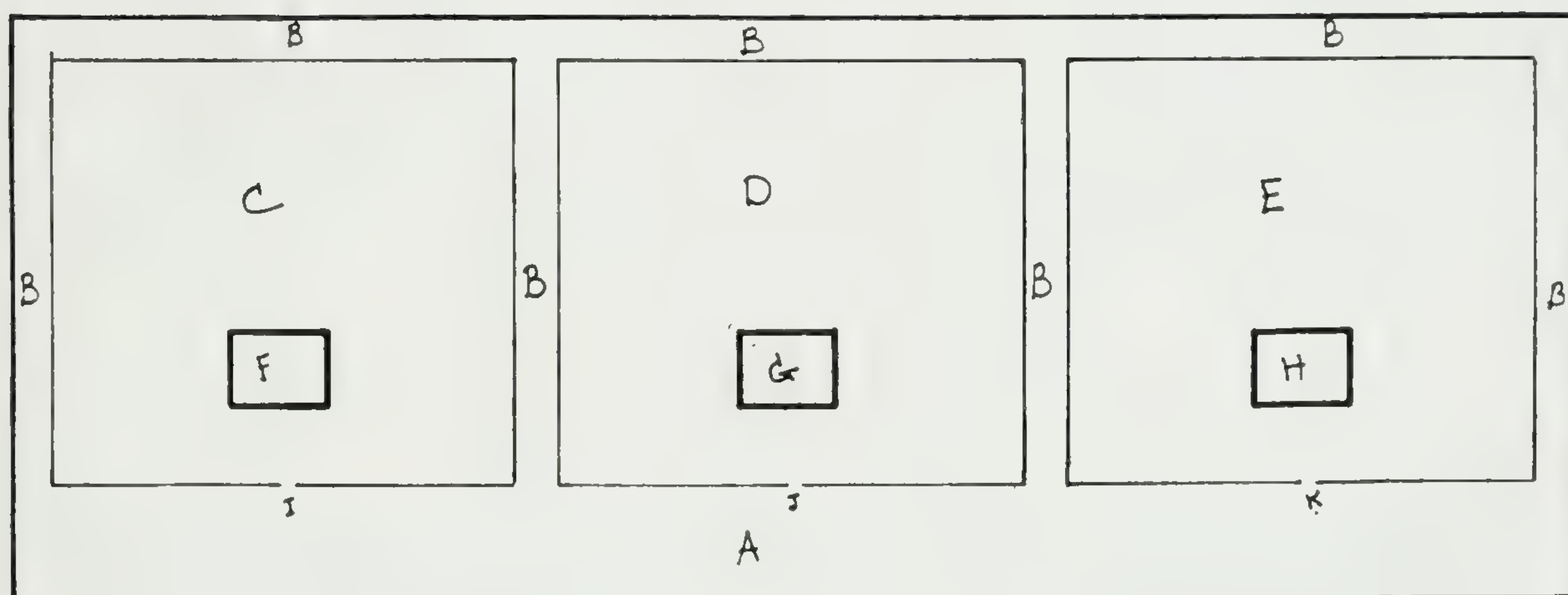


Diagram of the Experimental Turkey Plot at the Biological Laboratory.

- "A" Laneway from which entry is secured to each individual plot.
- "B" Dead line around the experimental plots to prevent the transmission of infection by contact.
- "C" "D" "E" Individual plots. Approximately one acre each.
- "F" "G" "H" Turkey Shelters. See Plate.
- "I" "J" "K" Gates to enter plots from "A".



FIG. 1. Warble Flies.



FIG. 2. Warble Flies.

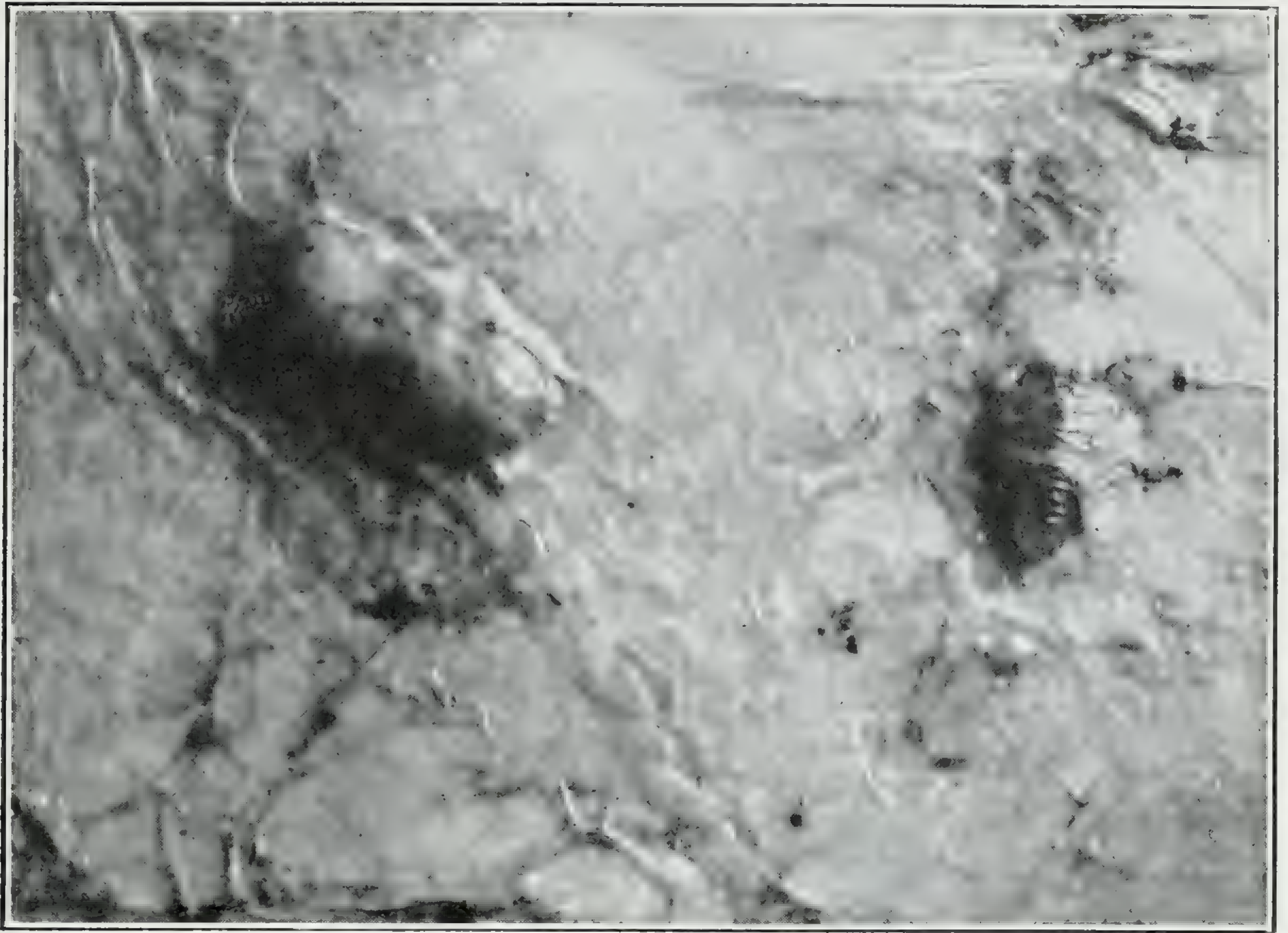


FIG. 3.

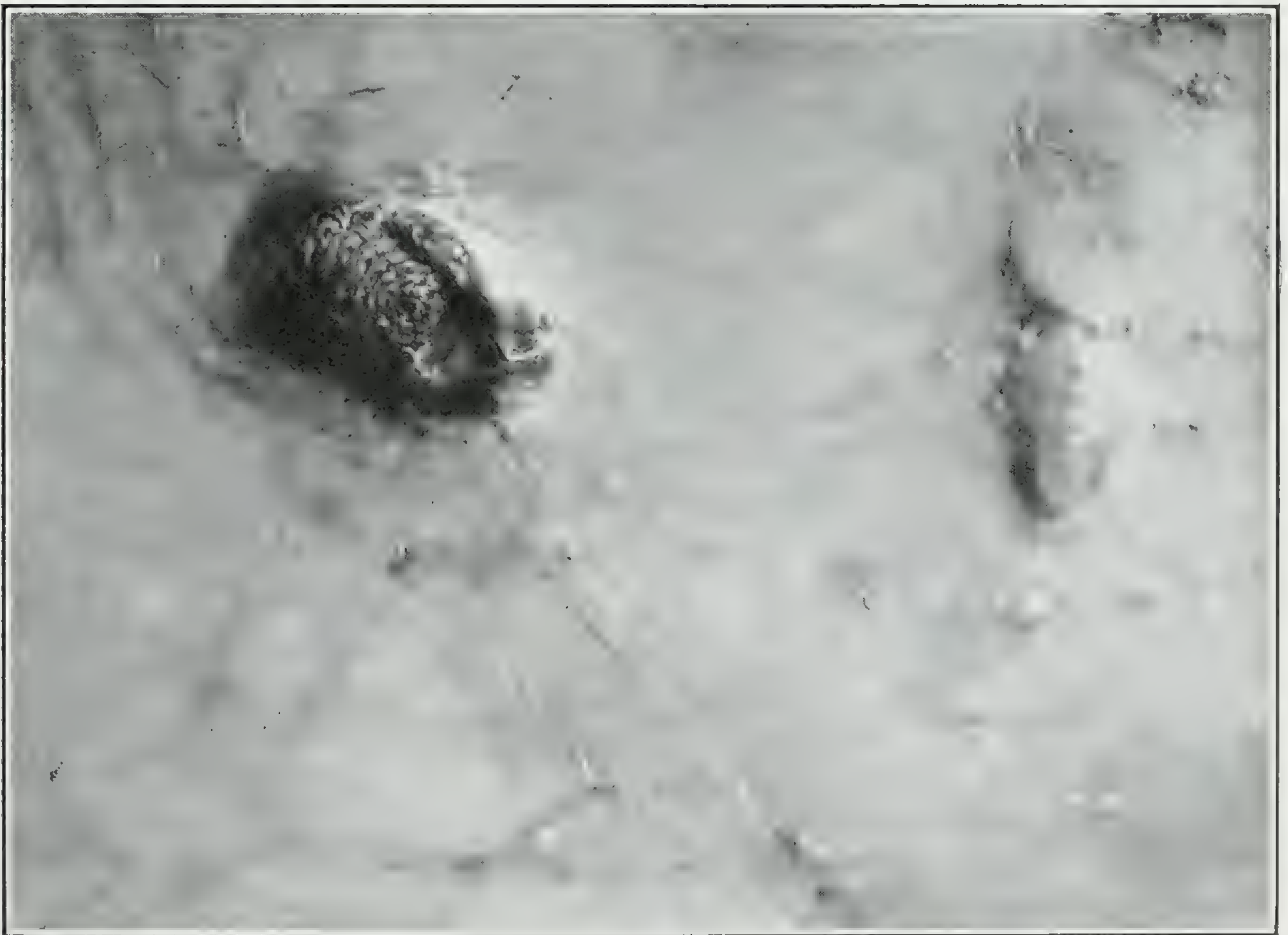


FIG. 4.



FIG. 5.
Piece of skin from cow showing the nodules caused by *Demodox bovis* (Stiles).



FIG. 6.
Enlargement of a portion of the skin illustrated in Fig. 5. The hairs have adapted themselves to the shape of the nodules. Photo. S. Hadwen.

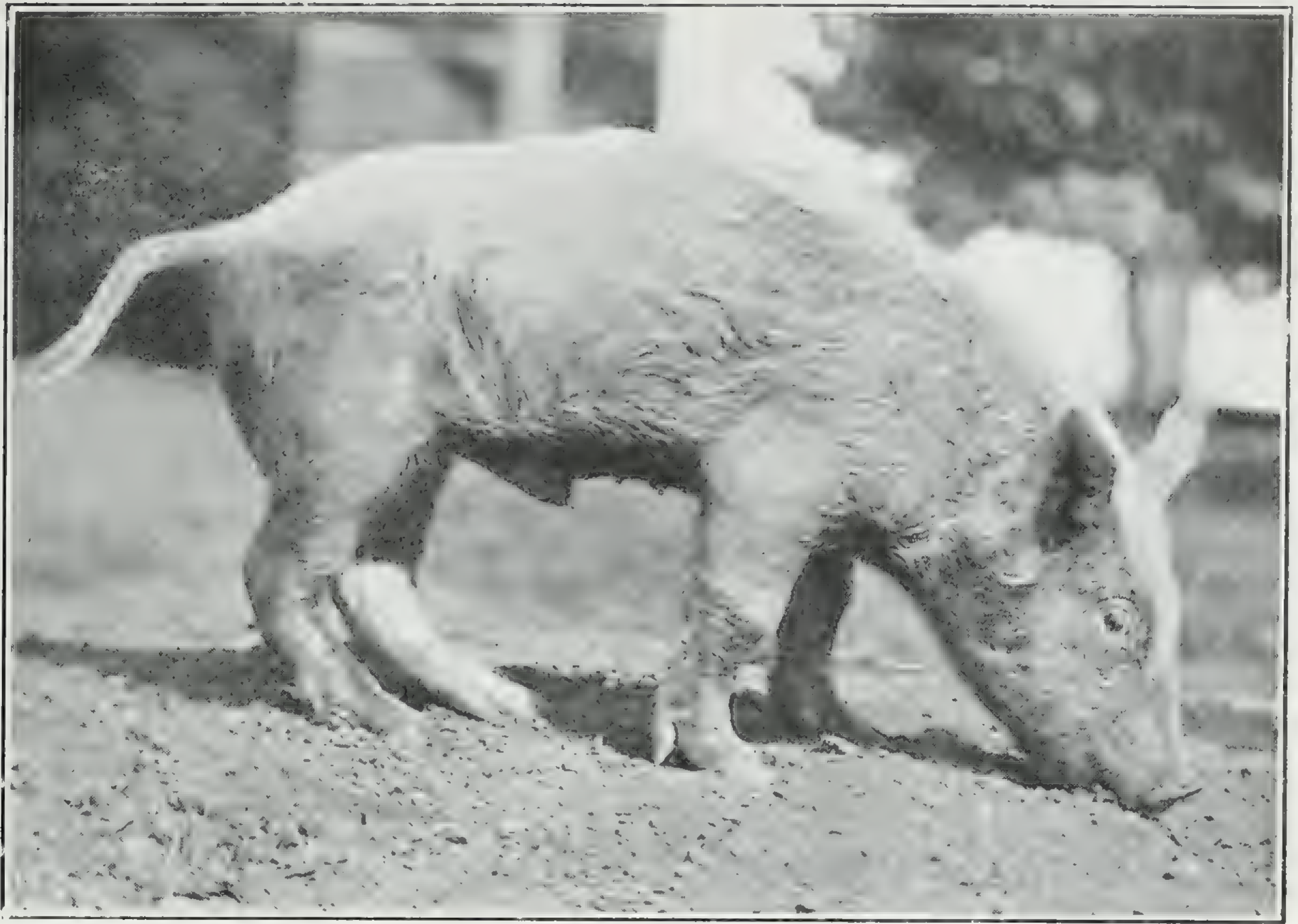


FIG. 7. Veterinary Research Laboratory, Agassiz, B.C.



FIG. 8.

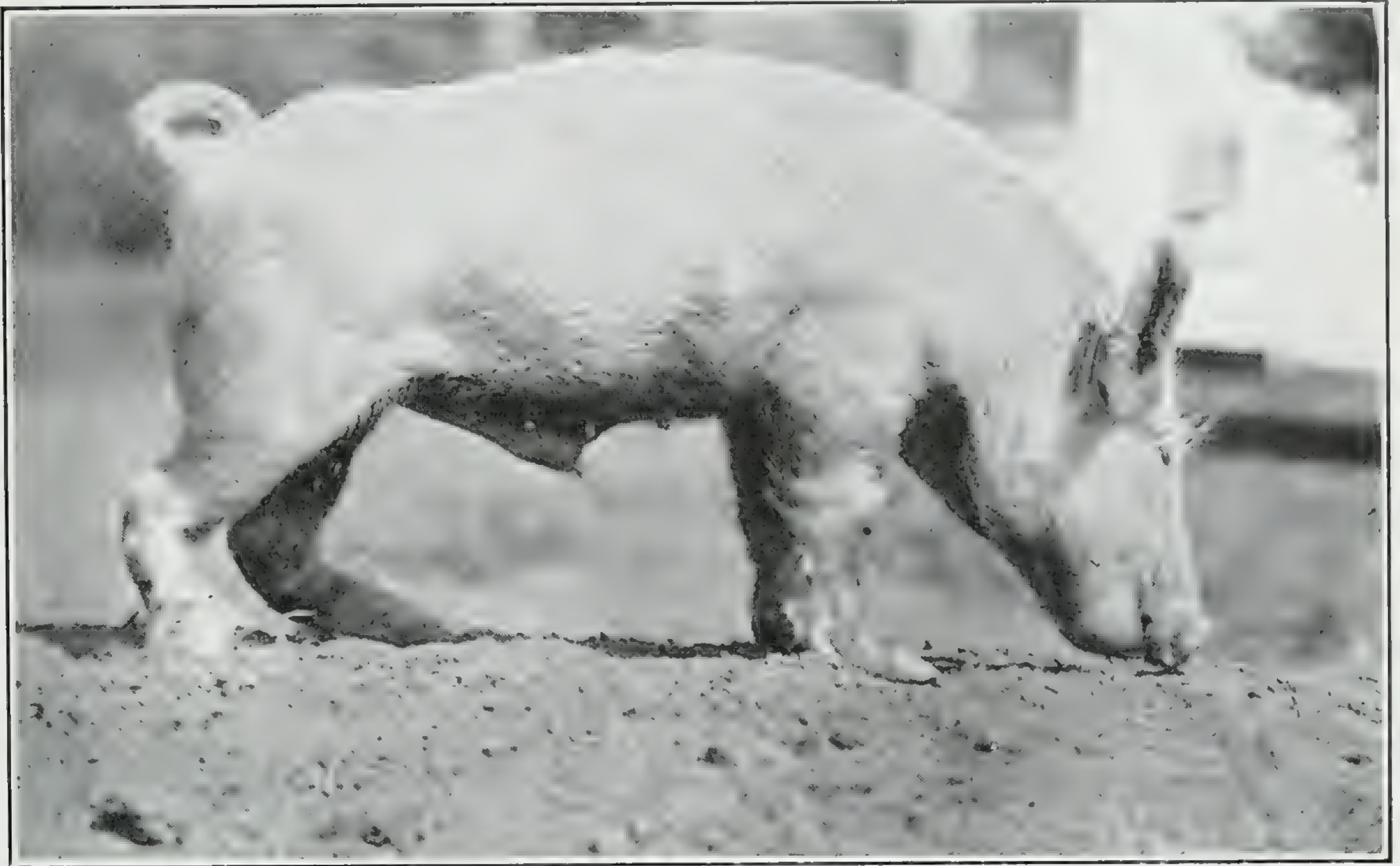
- A. Air plate exposed on April 23rd. 107 colonies counted.
 B. Milk plate exposed on same date. 135 colonies $\times 200 = 270,000$ per c.c. The colonies in the milk plate, being submerged, developed less rapidly.



Typical case. Note length of hair. Rice meal feeding experiment.



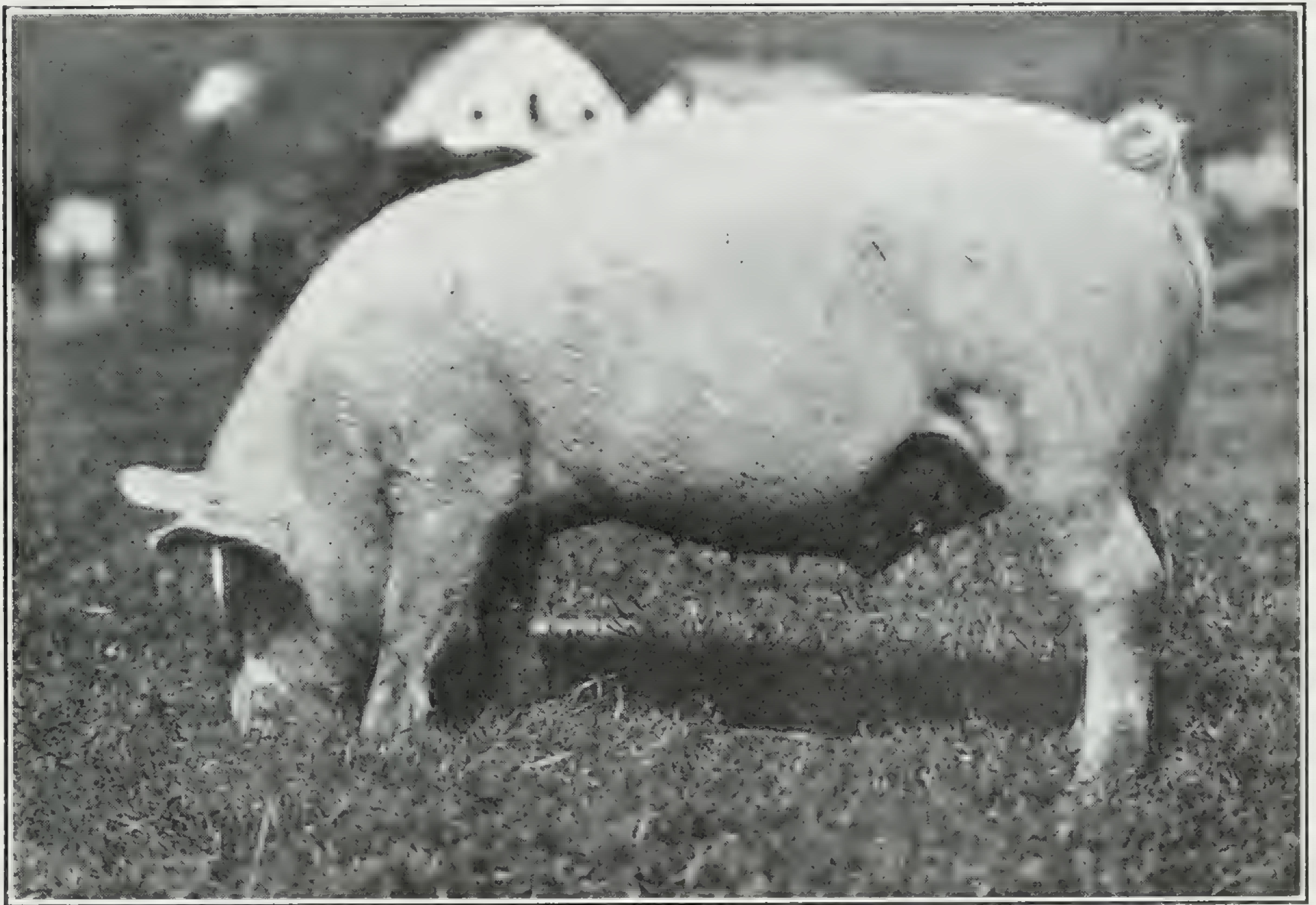
This pig was subject to heart attacks. Kept fat but stunted in growth. On P.M. a well marked pericarditis was found and edema of the lungs. Rice meal feeding experiment.



Rice meal feeding experiment.



At one time this pig could not walk at all, rice meal was stopped and shorts substituted. Now the animal can walk with difficulty. Rice meal feeding experiment.



Control pig same weight and age at beginning of experiment. Rice meal feeding experiment.

